Drinking Water Surveillance Program

Manitouwadge
Well Supply

Report for 1991 and 1992

Ⓥ Ontario #3121 E

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MANITOUWADGE WELL SUPPLY

DRINKING WATER SURVEILLANCE PROGRAM

REPORT FOR 1991 AND 1992

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Cette publication technique
n'est disponible qu'en anglais.

EXECUTIVE SUMMARY

DRINKING WATER SURVEILLANCE PROGRAM

MANITOUWADGE WELL SUPPLY
1991 AND 1992 REPORT

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to include all municipal supplies in Ontario. In 1991, 96 supplies and in 1992, 109 supplies were being monitored.

The Manitouwadge well supply has a groundwater source. Wells 1 and 2 are located adjacent to the reservoir. Wells 3, 4 and 5 are located approximately one kilometer from the reservoir. Raw water from the remote wells is pumped through a 250 mm diameter ductile iron water main directly to the reservoir. The raw water from all wells passes through two parallel aeration towers in which the water cascades down the baffled towers, mixes in the reservoir and is disinfected. This supply has a maximum pumping capacity of 13.2 x 1000 m^3/day. The Manitouwadge well supply serves a population of approximately 4,500.

Raw water from 4 wells, treated water from the reservoir and at one location in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons and volatiles) and radiological (radionuclides). Most laboratory analyses were conducted at the Ministry of the Environment and Energy facilities in Rexdale, Ontario. Radionuclides were analyzed by the Ministry of Labour.

Table A is a summary of all results by group.

The health related guideline for turbidity was exceeded in one treated water sample. The District Officer was notified. Operational staff reported the bacteriological quality at that time was good, indicating acceptable disinfection.

No other known health related guidelines were exceeded.

The Manitouwadge well supply, for the sample years 1991 and 1992, produced acceptable quality water and this was maintained in the distribution system.

TABLE A

DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUWADGE WELL SUPPLY

SUMMARY TABLE BY SCAN

A POSITIVE VALUE DENOTES THAT THE RESULT IS GREATER THAN THE STATISTICAL LIMIT OF DETECTION AND IS QUANTIFIABLE
A '.' INDICATES THAT NO SAMPLE WAS TAKEN

SCAN	WELL 1			WELL 2			WELL 3			WELL 4		
	RAW TESTS	POSITIVE	%POSITIVE	RAW TESTS	POSITIVE	%POSITIVE	RAW TESTS	POSITIVE	%POSITIVE	RAW TESTS	POSITIVE	%POSITIVE
BACTERIOLOGICAL	23	1	4	2	0	0	27	3	11	2	0	0
CHEMISTRY (FIELD)	23	23	100	2	2	100	26	26	100	2	2	100
CHEMISTRY (LABORATORY)	303	238	78	23	19	82	327	250	76	23	19	82
METALS	312	115	36	24	8	33	336	117	34	24	9	37
CHLOROAROMATICS	98	0	0	14	0	0	112	0	0	14	0	0
PESTICIDES AND PCB	261	0	0	35	0	0	295	0	0	35	0	0
PHENOLICS	13	1	7	1	0	0	13	1	7	1	0	0
POLYAROMATIC HYDROCARBONS	101	0	0	.	.	.	84	0	0	.	.	.
SPECIFIC PESTICIDES	2	0	0	.	.	.	2	0	0	.	.	.
VOLATILES	379	1	0	31	3	3	410	14	3	31	0	0
RADIONUCLIDES	14	4	28	.	.	.	14	5	35	.	.	.
TOTAL	1,529	383	30	132	30		1,646	416	30	132	30	

TABLE A
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUWADGE WELL SUPPLY

SUMMARY TABLE BY SCAN

A POSITIVE VALUE DENOTES THAT THE RESULT IS GREATER THAN THE STATISTICAL LIMIT OF DETECTION AND IS QUANTIFIABLE
A '.' INDICATES THAT NO SAMPLE WAS TAKEN

SCAN	RESERVOIR TREATED			DIST. SYSTEM WARBLER DR		
	TESTS	POSITIVE	%POSITIVE	TESTS	POSITIVE	%POSITIVE
BACTERIOLOGICAL	33	5	15	35	8	22
CHEMISTRY (FIELD)	66	56	84	128	103	80
CHEMISTRY (LABORATORY)	336	262	77	567	504	88
METALS	336	123	36	621	278	44
CHLOROAROMATICS	112	0	0	112	0	0
PESTICIDES AND PCB	296	0	0	178	0	0
PHENOLICS	14	1	7	.	.	.
POLYAROMATIC HYDROCARBONS	67	0	0	84	0	0
SPECIFIC PESTICIDES	2	0	0	2	0	0
VOLATILES	410	42	10	410	42	10
RADIONUCLIDES	14	3	21	.	.	.
TOTAL	1,686	492		2,137	935	

DRINKING WATER SURVEILLANCE PROGRAM

MANITOUWADGE WELL SUPPLY
1991 AND 1992 REPORT

INTRODUCTION

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to include all municipal supplies in Ontario. In 1991, 96 supplies and in 1992, 109 supplies were being monitored.

Appendix A has a full description of the DWSP.

The DWSP was initiated for the Manitouwadge well supply in January 1991. This is the first published DWSP report.

PLANT DESCRIPTION

The Manitouwadge well supply has a groundwater source. Wells 1 and 2 are located adjacent to the reservoir. Wells 3, 4 and 5 are located approximately one kilometer from the reservoir. Raw water from the remote wells is pumped through a 250 mm diameter ductile iron water main directly to the reservoir. The raw water from all wells passes through two parallel aeration towers in which the water cascades down the baffled towers, mixes in the reservoir and is disinfected. This supply has a maximum pumping capacity of 13.2 x 1000 m^3/day. The Manitouwadge well supply serves a population of approximately 4,500.

The sample day flows ranged from 1.8 x 1000 m^3/day to 4.6 x 1000 m^3/day.

General information for the water supply is presented in Table 1 and a schematic of plant processes, chemical addition points and sampling locations in Figure 1.

SAMPLING AND ANALYSES

Stringent DWSP sampling protocols were followed to ensure that all samples were collected in a uniform manner (see Appendix B).

Sample lines at the wells and the reservoir were flushed prior to sampling to ensure that the water obtained was indicative of its origin and not residual water standing in the sample line.

Supply operating personnel routinely analyzed parameters for process control (see Table 2 if data is provided).

At all distribution system locations, two types of samples were obtained, a standing and a free flow. The standing sample consisted of water that had been in the household plumbing and service connection for a minimum of six hours. These samples were used to make an assessment of the change in the levels of inorganic compounds and metals due to leaching from, or deposition on, the plumbing system. The only analyses carried out on the standing samples, therefore, were laboratory chemistry and metals. The free flow sample represented fresh water from the distribution system main, since the sample tap was flushed for five minutes prior to sampling.

Raw water from 4 wells, treated water from the reservoir and at one location in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons and volatiles) and radiological (radionuclides). Most laboratory analyses were conducted at the Ministry of the Environment and Energy facilities in Rexdale, Ontario. Radionuclides were analyzed by the Ministry of Labour.

RESULTS

Field measurements were recorded on the day of sampling and were entered onto the DWSP database as submitted by plant personnel.

Table 3 (when data is provided) contains information on flow rate and treatment chemicals dosages.

Table 4 is a summary of all results by parameter and by water type. If a parameter was not detected, the total number of negative sample results is given. In contrast, if a parameter was detected at any location, the detailed results for all samples are provided.

Positive denotes that the result is greater than the statistical limit of detection established by the Ministry of the Environment and Energy laboratory staff and is quantifiable. Trace (<T) denotes that the level measured is greater than the lowest value detectable by the method but lies so close to the detection limit that it cannot be confidently quantified.

Table 5 lists all parameters analyzed in the DWSP.

Associated guidelines and detection limits are also supplied on Tables 4 and 5. Parameters are listed alphabetically within each scan.

DISCUSSION

GENERAL

Water quality was judged by comparison with the Ontario Drinking Water Objectives publication (ODWOs). When an Ontario Drinking Water Objective (ODWO) was not available, guidelines/limits from other agencies were used. These guidelines were obtained from the Parameter Listing System database.

The guidelines are evaluated on the results from the free flowing samples. Standing samples in the distribution system can show elevated concentrations in certain metals if the water is corrosive or if the standing time is excessive. Flushing the tap until the water achieves the coolest temperature will ensure that the water used for consumption will contain minimum concentrations of metals.

IN REPORTS FOR GROUND WATER SUPPLIES, WHERE:
  - **TREATMENT CAN BE LIMITED TO DISINFECTION;**
  - **MANY WELLS CAN FEED INTO THE DISTRIBUTION SYSTEM INDEPENDENTLY; AND**
  - **TREATED SAMPLES, WHEN AVAILABLE, ARE TAKEN FROM RESERVOIRS;**

THIS SECTION WILL DISCUSS:
  - **RESULTS FROM RAW, TREATED AND DISTRIBUTED WATERS;**
  - **THOSE PARAMETERS WITH CONCENTRATIONS ABOVE GUIDELINE VALUES; AND**
  - **POSITIVE ORGANIC PARAMETERS DETECTED.**

In this report comments are combined for all sample locations for each parameter discussed.

BACTERIOLOGICAL

Guidelines for bacteriological sampling and testing of a supply are developed to maintain a proper supervision of its bacteriological quality. Routine monitoring programs usually require that multiple samples be collected in a given system. Full interpretation of bacteriological quality cannot be made on the basis of single samples. Standard plate count was the only bacteriological analysis conducted on the treated and distributed water. No results were above the guideline.

INORGANIC & PHYSICAL

CHEMISTRY (LABORATORY)

Calcium exceeded the European Economic Community Aesthetic Guideline Level of 100 mg/L in 5 of 28 treated and distributed water samples with a maximum reported value of 118.1 mg/L.

Colour in drinking water may be due to the presence of natural or synthetic substances as well as certain metallic ions. Colour is measured in Hazen units (HZU).

Colour exceeded the ODWO Aesthetic Objective of 5 HZU in 1 of 28 treated and distributed water samples with a maximum reported value of 6.0 HZU.

Elevated conductivity is often associated with high hardness levels.

Conductivity exceeded the European Economic Community Aesthetic Guideline Level of 400 umho/cm in all 28 treated and distributed water samples with a maximum reported value of 808 umho/cm.

The ODWOs indicate that a hardness level of between 80 and 100 mg/L as calcium carbonate for domestic waters provides an acceptable balance between corrosion and encrustation. Water supplies with a hardness greater than 200 mg/L are considered poor and possess a tendency to form scale deposits and result in excessive soap consumption.

Hardness exceeded the ODWO Recommended Operational Guideline of 80-100 mg/L and also exceeded 200 mg/L in all 28 treated and distributed water samples with a maximum reported value of 389 mg/L.

Dissolved solids exceeded the ODWO Aesthetic Objective of 500 mg/L in 1 of 28 treated and distributed water samples with a maximum reported value of 520 mg/L.

Turbidity in water is caused by the presence of suspended matter such as clay, silt, colloidal particles, plankton and other microscopic organisms. The most important potential health effect of turbidity is its interference with disinfection in the treatment plant and the maintenance of a chlorine residual. The ODWO Maximum Acceptable Concentration for turbidity is 1.0 Formazin Turbidity Unit (FTU).

Turbidity exceeded the ODWO Maximum Acceptable Concentration of 1.0 FTU in 1 of 14 treated water samples with a maximum reported value of 5.7 FTU. The corresponding and more reliable field turbidity results were not reported. In ground water samples, turbidity can increase if the samples are not analyzed immediately in the field. This is frequently caused by precipitating iron and manganese but can also be due to precipates formed from sulphides or calcium. The District Officer was advised of the situation.

METALS

Manganese, in high concentrations, can contribute to laundry staining and undesirable tastes.

Manganese exceeded the ODWO Aesthetic Objective of 50.0 ug/L in 13 of 28 treated and distributed water samples with a maximum reported value of 750 ug/L.

The numerous minerals and salts detected above aesthetic guidelines is characteristic of many groundwater sources.

ORGANIC

 CHLOROAROMATICS

The results of the chloroaromatic scan showed that none were detected.

 CHLOROPHENOLS

The chlorophenol scan was not requested during this sampling period.

 PESTICIDES AND PCB

The results of the pesticide and PCB scan showed that none were detected above trace levels.

 PHENOLICS

Phenolic compounds are present in the aquatic environment as a result of natural and/or industrial processes. The ODWOs have been revised to replace the phenolic aesthetic objective with objectives for specific phenols.

Phenolics was found at a positive level in 1 of the 14 treated water samples analyzed. The maximum observed level was 1.4 ug/L.

 POLYAROMATIC HYDROCARBONS

The results of the polyaromatic hydrocarbon scan showed that none were detected.

 SPECIFIC PESTICIDES

The specific pesticide scan was not requested during this sampling period.

 VOLATILES

The detection of benzene, ethylbenzene, toluene and xylenes at low, trace levels may be a laboratory artifact derived from the analytical methodology. Trace levels of styrene are considered to be laboratory artifacts resulting from the sample shipping containers.

Tetrachloroethylene was found at positive levels in 2 of 28 treated and distributed water samples analyzed. The maximum observed level was 0.9 ug/L. This was below the ODWO Health Related Guidance Value of 65 ug/L.

Tetrachloroethylene was detected at positive levels in all 14 raw water samples from well 3. The maximum observed level was 5.4 ug/L.

Trichloroethylene was detected at low trace levels in 8 of 14 raw water samples from one well.

1,1,1-Trichloroethane was detected at positive levels in 2 raw water samples from well 1. Trace levels were detected in most sample sites. The maximum observed level was 0.46 ug/L. The US Environmental Protection Agency (EPA) has a Maximum Contaminant Level of 200 ug/L.

Trihalomethanes (THMs) are produced during the water treatment process and will always occur in chlorinated waters. THMs are comprised of chloroform, chlorodibromomethane and dichlorobromomethane. Bromoform occurs occasionally. Results are reported for the individual compounds as well as for total THMs. Only total THM results are discussed. Starting in 1991, samples from the distribution system were quenched with sodium thiosulphate to stop the further production of THMs in the sample bottle. This provided a more representative estimation of the THMs consumed in tap water.

Total trihalomethanes were found at positive levels in 24 of 28 treated and distributed water samples analyzed. The maximum observed level was 48.1 ug/L. This was below the ODWO Maximum Acceptable Concentration of 350 ug/L.

Chloroform was detected at trace levels in 9 of 13 raw water samples from one well. It was not evident that backmixing of chlorine had occurred when the raw water samples were taken and it suggests that chloroform may be present at trace levels in the raw water source. However, the pump at this location is lubricated with treated chlorinated water which contains chloroform.

RADIOLOGICAL

RADIONUCLIDES

There are more than 200 radionuclides, some of which occur naturally and others which originate from the activities of society. The radionuclides currently of greater interest from a health view-point are tritium, strontium-90, iodine-131, cesium-137 and radium-226. The gross beta and gross alpha determinations are suitable for preliminary screening except for tritium which must be measured separately. Radionuclides are measured in becquerels per litre (Bq/L). No results were above the available guidelines.

CONCLUSIONS

The health related guideline for turbidity was exceeded in one treated water sample. In groundwater supplies turbidity can increase in the sample due to precipitation of iron and manganese. The District Officer was advised to check the bacteriological results in the treated and distributed water to ensure there was adequate disinfection. Operational staff reported the bacteriological quality at that time was good, indicating acceptable disinfection.

No other known health related guidelines were exceeded.

The Manitouwadge well supply, for the sample years 1991 and 1992, produced acceptable quality water and this was maintained in the distribution system.

TABLE 1

DRINKING WATER SURVEILLANCE PROGRAM

PLANT GENERAL REPORT

PLANT NAME: MANITOUWADGE WELL SUPPLY
WORKS #:   220000219
UTM #:   165384545373961

DISTRICT: THUNDER BAY
REGION: NORTHWEST
DISTRICT OFFICER: D.W. MURRAY

SUPERINTENDENT: OSMO KANKKUNEN

ADDRESS: MANITOU RD.
                      MANITOUWADGE, ONTARIO
                      P0T 2C0
                      807-826-3227 (EXT. 226)

MUNICIPALITY: MANITOUWADGE
AUTHORITY: MUNICIPAL

PLANT INFORMATION

          MAXIMUM PUMPING CAPACITY: 13.200   (X 1000 M3/DAY)
                   RATED CAPACITY: 10.560   (X 1000 M3/DAY)

MUNICIPALITY	POPULATION
MANITOUWADGE	4,500

TABLE 3

DRINKING WATER SURVEILLANCE PROGRAM MANITOUWADGE WELL SUPPLY SAMPLE DAY CONDITIONS
AND TREATMENT CHEMICAL DOSAGES IN (MG/L) FOR 1991 AND 1992

DATE	DELAY * TIME(HRS)	FLOW (1000M3)	POST CHLORINATION SODIUM HYPOCHLORITE
91 FEB 13	.00	2.841	.78
91 MAY 28	.00	2.736	1.06
91 JUN 25	.00	4.536	1.42
91 JUL 23	.00	3.528	1.02
91 AUG 13	.00	4.608	1.02
91 SEP 24	.00	3.168	1.63
91 OCT 22	.00	3.528	2.03
92 JAN 28	.00	3.168	1.40
92 MAY 05	.00	3.600	1.40
92 JUL 28	.00	1.872	1.43

* THE DELAY TIME BETWEEN THE RAW AND TREATED WATER SAMPLING, SHOULD ESTIMATE THE RETENTION TIME.

KEY TO TABLE 4 and 5

A   ONTARIO DRINKING WATER OBJECTIVES (ODWO)
1.   Maximum Acceptable Concentration (MAC)
1+. MAC for Total Trihalomethanes
2.   Interim Maximum Acceptable Concentration (IMAC)
3.   Aesthetic Objective (AO)
3*. AO for Total Xylenes
4.   Recommended Operational Guideline
5.   Health Related Guidance Value

B   HEALTH & WELFARE CANADA (H&W)
1.   Maximum Acceptable Concentration (MAC)
2.   Proposed MAC
3.   Interim MAC
4.   Aesthetic Objective (AO)

C   WORLD HEALTH ORGANIZATION (WHO)
1.   Guideline Value (GV)
2.   Tentative GV
3.   Aesthetic GV

D   US ENVIRONMENTAL PROTECTION AGENCY (EPA)
1.   Maximum Contaminant Level (MCL)
2.   Suggested No-Adverse Effect Level (SNAEL)
3.   Lifetime Health Advisory
4.   EPA Ambient Water Quality Criteria

F   EUROPEAN ECONOMIC COMMUNITY (EEC)
1.   Health Related Guideline Level
2.   Aesthetic Guideline Level
3.   Maximum Admissable Concentration (MADC)

G   CALIFORNIA STATE DEPARTMENT OF HEALTH-GUIDELINE VALUE

I   NEW YORK STATE AMBIENT WATER GUIDELINE

N/A   NONE AVAILABLE

LABORATORY RESULTS, REMARK DESCRIPTIONS

.	No Sample Taken
BDL	Below Minimum Measurement Amount
<T	Greater Than Detection Limit But Not Confident (SEE INTERPRETATION OF RESULTS ABOVE)
>	Results Are Greater Than The Upper Limit
<=>	Approximate Result
!48	No Data: Sample Age Exceeded 48 Hours
!AR	No Data: No Numeric Results
!AW	No Data: Analysis Withdrawn
!BT	No Data: Sample Broken In Transit
!CS	No Data: Contamination Suspected
!EF	No Data: Laboratory Equipment Failure
!IR	No Data: Insufficient Sample
!IS	No Data: Insufficient Sample
!LA	No Data: Laboratory Accident
!NP	No Data: No Procedure
!NR	No Data: Sample Not Received
!OP	No Data: Obscured Plate
!PE	No Data: Procedure Error: Sample Discarded
!PR	No Data: Preservative Required
!QU	No Data: Quality Control Unacceptable
!RE	No Data: Received Empty
!RO	No Data: No Numeric Results
!SM	No Data: Sample Missing
!SS	No Data: Sample Improperly Preserved
!U	No Data: Sample Unsuitable For Analysis
!UB	No Data: Bottle Broken
!UN	No Data: Result Unreliable

!UR	No Data: Unpreserved Sample Required
A	Approximate Value
A3C	Approximate, Total Count Exceeded 300 Colonies
A>	Approximate Value, Exceeded Normal Range
APS	Additional Peak, Less Than, Not Priority Pollutant
ARO	Additional Information In Laboratory Report
CRO	Calculated Result Only
NAF	Not All Required Tests Found
RID	Ioncal Calculated on Incomplete Data Set
RMP	P and M-Xylene Not Separated
RRR	Result Obtained by Repeat Analysis
RRV	Rerun Verification
SFA	Sample Filtered: Filtrate Analyzed
SIL	Sample Incorrectly Labelled
SPS	Several Peaks, Small, Not Priority Pollutant
U48	Unreliable: Sample Age Exceeded 48 Hours
UAL	Unreliable: Sample Age Exceeded Limit
UAU	Unreliable: Sample Age Unknown
UCS	Unreliable: Contamination Suspected
USD	Unreliable: Sample Decomposition Noted
WSD	Wrong Sample Description On Bottle

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUWADGE WELL SUPPLY

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
BACTERIOLOGICAL							
FECAL COLIFORM MF (CT/100ML)			DET'N LIMIT = 0		GUIDELINE = 0 (A1)		
20 SAMPLES	BDL	BDL	BDL	BDL	.	.	.
TOTAL COLIFORM MF (CT/100ML)			DET'N LIMIT = 0		GUIDELINE = 5/100ML (A1)		
20 SAMPLES	BDL	BDL	BDL	BDL	.	.	.
STANDRD PLATE CNT MF (CT/ML)			DET'N LIMIT = 0		GUIDELINE = 500 (A3)		
1991 JAN	.		.		5	6	.
1991 FEB	.		.		2	36	.
1991 APR	.		.		2	4	.
1991 JUN	1		42		0	5	.
1991 JUL	.		69		15	3	.
1991 AUG	.		.		!CS	3	.
1991 SEP	.		.		0	0	.
1991 OCT	.		.		0	7	.
1991 NOV	.		.		!CS	!CS	.
1992 JAN	.		.		.	.	.
1992 MAY	.		.		3	2	.
1992 JUL	.		.		!CS	0	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUWADGE WELL SUPPLY

FLD CHLORINE (COMB) (MG/L)   DET'N LIMIT = 0

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER OR FREE FLOW	DIST. SYSTEM WARBLER OR STANDING
			GUIDELINE = N/A				
1991 JAN					.900	.000	.000
1991 FEB					.000	.000	.000
1991 APR					.000	.000	.000
1991 APR					.000	.000	.000
1991 JUN					.000	.000	.000
1991 JUL					.000	.000	.000
1991 AUG					.000	.000	.000
1991 SEP					.000	.000	.000
1991 OCT					.000	.000	.000
1991 NOV					.000	.000	.000
1992 JAN					.000	.000	.000
1992 MAY					.200	.200	.200
1992 JUL							.200

FLD CHLORINE FREE (MG/L)   DET'N LIMIT = 0

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER OR FREE FLOW	DIST. SYSTEM WARBLER OR STANDING
			GUIDELINE = N/A				
1991 JAN					.300	.200	.200
1991 FEB					.200	.200	.200
1991 APR					.200	.200	.200
1991 APR					.200	.200	.200
1991 MAY					.400	.200	.200
1991 JUN					.800	.000	.000
1991 JUL					.400	.200	.200
1991 AUG					.400	.200	.200
1991 SEP					.800	.200	.200
1991 OCT					1.200	.200	.200
1991 NOV					.200	.200	.200
1992 JAN					.400	.200	.200
1992 MAY					.200	.200	.200
1992 JUL					.200		.200

FLD CHLORINE (TOTAL) (MG/L)   DET'N LIMIT = 0

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER OR FREE FLOW	DIST. SYSTEM WARBLER OR STANDING
			GUIDELINE = N/A				
1991 JAN					1.200	.200	.200
1991 FEB					.200	.200	.200
1991 APR					.200	.200	.200
1991 APR					.200	.200	.200
1991 MAY					.400	.200	.200
1991 JUN					.800	.000	.000
1991 JUL					.400	.200	.200
1991 AUG					.400	.200	.200
1991 SEP					.800	.200	.200
1991 OCT					1.200	.200	.200
1991 NOV					.200	.200	.200
1992 JAN					.400	.200	.200
1992 MAY					.400	.400	.400
1992 JUL					.200		.400

CHEMISTRY (FIELD)

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUWADGE WELL SUPPLY

FLD PH (DMNSLESS)   CHEMISTRY (FIELD)

DET'N LIMIT = N/A   GUIDELINE = 6.5-8.5 (A4)

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
1991 JAN	7.000	.	7.200	.	7.600	7.600	.
1991 FEB	7.000	.	7.000	.	7.600	7.600	7.600
1991 APR	7.000	.	7.200	.	7.400	7.400	7.600
1991 APR	7.000	.	7.200	.	7.400	7.400	7.800
1991 MAY	7.000	.	7.200	.	7.600	7.400	7.400
1991 JUN	7.000	.	7.400	.	7.600	7.600	7.600
1991 JUL	7.600	.	7.200	.	.	7.600	7.600
1991 AUG	7.200	.	7.400	.	7.600	7.600	7.600
1991 SEP	7.200	.	7.200	.	7.200	7.400	7.400
1991 OCT	7.200	.	7.400	.	7.400	7.400	7.400
1991 NOV	7.600	.	7.400	.	.	7.600	7.600
1992 JAN	7.400	.	7.400	.	7.600	7.600	7.600
1992 MAY	7.000	.	7.200	.	7.600	7.600	7.600
1992 JUL	.	7.200	7.200	7.400	7.600	.	7.600

FLD TEMPERATURE (DEG.C)

DET'N LIMIT = N/A   GUIDELINE = 15 (A3)

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
1991 JAN	4.000	.	6.000	.	5.500	4.500	.
1991 FEB	4.000	.	4.000	.	6.000	4.500	6.000
1991 APR	7.000	.	5.000	.	5.000	4.000	7.000
1991 APR	5.000	.	5.000	.	5.000	3.500	8.500
1991 MAY	.	.	.	.	5.000	5.000	5.000
1991 JUN	6.000	.	6.000	.	6.000	8.000	8.000
1991 JUL	11.000	.	6.000	.	11.000	11.000	11.000
1991 AUG	6.000	.	7.000	.	6.000	11.000	11.000
1991 SEP	7.000	.	.	.	7.000	11.000	11.000
1991 OCT	.	.	8.000	.	6.000	9.000	9.000
1991 NOV	7.000	.	7.000	.	7.000	8.000	8.000
1992 JAN	.	.	8.000	.	6.000	8.000	8.000
1992 MAY	6.000	.	6.000	.	6.000	6.000	6.000
1992 JUL	.	5.000	5.000	5.000	5.000	.	5.000

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUWADGE WELL SUPPLY

ALKALINITY (MG/L) — CHEMISTRY (LABORATORY)

DET'N LIMIT = 0.2   GUIDELINE = 30-500 (A4)

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
1991 JAN	305.700	.	270.600	.	250.500	252.400	.
1991 FEB	368.700	.	328.700	.	255.000	246.100	243.100
1991 APR	226.900	.	251.400	.	207.900	238.000	226.400
1991 APR	344.200	.	171.500	.	228.600	220.300	205.300
1991 MAY	318.500	.	210.300	.	258.700	232.500	235.800
1991 JUN	238.000	.	198.300	.	200.500	217.700	233.400
1991 JUL	342.300	.	206.000	.	205.000	221.300	221.600
1991 AUG	273.500	.	243.600	.	281.300	236.600	236.700
1991 SEP	301.200	.	251.300	.	231.900	248.400	245.800
1991 OCT	323.100	.	254.700	.	259.300	242.700	243.600
1991 NOV	283.500	.	225.000	.	248.000	253.900	251.500
1992 JAN	288.500	.	234.600	.	246.800	252.500	252.400
1992 MAY	411.400	.	198.500	.	209.100	195.800	196.600
1992 JUL	.	287.200	257.300	237.400	248.300	289.700	276.000

CALCIUM (MG/L)

DET'N LIMIT = 0.20   GUIDELINE = 100 (F2)

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
1991 JAN	99.440	.	97.500	.	91.700	95.950	.
1991 FEB	IIS	.	IIS	.	91.700	94.700	98.500
1991 APR	99.800	.	85.600	.	91.000	98.200	94.000
1991 APR	124.800	.	68.000	.	84.000	84.000	86.000
1991 MAY	110.000	.	90.600	.	100.000	94.200	95.000
1991 JUN	80.200	.	80.400	.	81.400	88.600	93.800
1991 JUL	116.000	.	88.400	.	84.400	90.400	90.000
1991 AUG	94.200	.	98.400	.	105.000	94.400	98.400
1991 SEP	100.400	.	99.600	.	92.300	99.900	101.300
1991 OCT	108.300	.	92.000	.	96.600	97.400	98.200
1991 NOV	117.700	.	98.800	.	104.000	105.400	102.300
1992 JAN	78.400	.	91.200	.	90.100	96.800	104.900
1992 MAY	-135.100	.	88.000	.	85.100	82.700	81.400
1992 JUL	.	125.600	109.100	100.800	107.600	118.100	112.000

CYANIDE (MG/L)

DET'N LIMIT = 0.001   GUIDELINE = 0.2 (A1)

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
36 SAMPLES	BDL	.	BDL	.	BDL	ISM	.

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUWADGE WELL SUPPLY

CHEMISTRY (LABORATORY)

CHLORIDE (MG/L)

DET'N LIMIT = 0.20 GUIDELINE = 250 (A3)

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
1991 JAN	61.000	.	69.900	.	47.500	36.200	
1991 FEB	59.600	.	68.900	.	52.100	36.300	35.700
1991 APR	56.100	.	30.400	.	32.100	28.000	25.400
1991 APR	56.300	.	8.700	.	33.900	22.800	18.200
1991 MAY	59.600	.	18.700	.	39.400	31.100	31.300
1991 JUN	60.200	.	14.700	.	20.400	25.700	30.300
1991 JUL	60.600	.	18.400	.	20.600	27.500	26.800
1991 AUG	62.700	.	34.500	.	50.900	31.800	30.400
1991 SEP	69.300	.	51.200	.	36.400	39.800	38.700
1991 OCT	70.200	.	41.900	.	52.200	39.000	38.200
1991 NOV	82.600	.	35.000	.	36.800	40.700	38.700
1992 JAN	79.300	.	36.900	.	30.300	48.400	43.800
1992 MAY	65.400	.	18.000	.	18.300	16.900	15.800
1992 JUL	.	90.300	46.900	35.600	44.700	63.100	54.200

COLOUR (HZU)

DET'N LIMIT = 0.50 GUIDELINE = 5 (A3)

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
1991 JAN	3.000	.	1.500 <T	.	2.000 <T	2.500	
1991 FEB	2.000 <T	.	.500 <T	.	2.000 <T	1.500 <T	.500 <T
1991 APR	4.000	.	2.500	.	3.500	3.000	3.000
1991 APR	3.500	.	BDL	.	3.000	1.500 <T	1.500 <T
1991 MAY	4.500	.	3.000	.	4.000	4.000	4.000
1991 JUN	3.000	.	2.000	.	3.000	3.000	1.000 <T
1991 JUL	4.000	.	2.000	.	3.500	3.000	3.000
1991 AUG	3.500	.	1.500	.	3.000	2.000	1.500
1991 SEP	4.500	.	2.500	.	3.500	3.500	3.000
1991 OCT	2.000	.	2.000	.	3.000	2.000	1.000 <T
1991 NOV	2.500	.	3.000	.	3.500	2.500	1.000 <T
1992 JAN	3.000	.	3.000	.	3.000	2.500	1.000 <T
1992 MAY	5.500	.	3.000	.	6.000	4.500	3.500
1992 JUL	.	11.000	3.000	3.500	2.500	2.500	2.500

DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUWADGE WELL SUPPLY

TABLE 4

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
CONDUCTIVITY (UMHO/CM)	CHEMISTRY (LABORATORY)		DET'N LIMIT = 1.0		GUIDELINE = 400 (F2)		
1991 JAN	847	.	864	.	711	643	.
1991 FEB	835	.	848	.	740	635	628
1991 APR	795	.	621	.	615	592	569
1991 APR	770	.	483	.	607	538	510
1991 MAY	774	.	547	.	627	571	571
1991 JUN	835	.	552	.	534	579	607
1991 JUL	838	.	570	.	544	582	581
1991 AUG	834	.	653	.	736	614	603
1991 SEP	884	.	761	.	636	671	663
1991 OCT	897	.	709	.	746	652	650
1991 NOV	826	.	624	.	657	674	660
1992 JAN	844	.	652	.	678	715	690
1992 MAY	878	.	540	.	526	514	506
1992 JUL	.	862	720	648	701	800	757

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
DISS ORG CARBON (MG/L)			DET'N LIMIT = 0.10		GUIDELINE = 5.0 (A3)		
1991 JAN	3.100	.	2.100	.	2.300	2.300	2.400
1991 FEB	3.200	.	2.400	.	2.500	2.200	2.800
1991 APR	3.300	.	2.100	.	2.900	2.700	3.400
1991 APR	3.100	.	2.100	.	2.800	2.700	2.500
1991 MAY	2.900	.	1.900	.	2.500	2.700	2.600
1991 JUN	2.800	.	2.000	.	2.700	2.500	2.700
1991 JUL	3.100	.	2.000	.	3.400	2.900	2.900
1991 AUG	3.800	.	2.300	.	3.100	2.900	2.700
1991 SEP	3.200	.	2.000	.	2.600	2.700	2.500
1991 OCT	3.300	.	1.800	.	2.600	2.600	2.300
1991 NOV	2.400	.	2.100	.	2.300	2.300	2.800
1992 JAN	2.100	.	2.100	.	2.200	2.300	3.200
1992 MAY	4.300	.	2.200	.	3.500	2.900	2.400
1992 JUL	.	2.300	2.100	2.100	2.200	2.300	

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUWADGE WELL SUPPLY

FLUORIDE (MG/L) CHEMISTRY (LABORATORY)

DET'N LIMIT = 0.01 GUIDELINE = 1.5 (A1)

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
1991 JAN	.060		.080		.100	.100	
1991 FEB	.060		.100		.080	.100	.100
1991 APR	.080		.100		.100	.100	.120
1991 APR	.060		.120		.080	.080	.100
1991 MAY	.040 <T		.120		.080	.100	.100
1991 JUN	.060		.140		.100	.100	.100
1991 JUL	.060		.140		.120	.100	.100
1991 AUG	.060		.120		.080	.100	.100
1991 SEP	.060		.100		.100	.100	.100
1991 OCT	.060		.100		.080	.100	.100
1991 NOV	.080		.120		.100	.100	.100
1992 JAN	.080		.080		.040 <T	.080	.080
1992 MAY	.080		.140		.120	.140	.140
1992 JUL		.060	.120	.100	.060	.100	.100

HARDNESS (MG/L)

DET'N LIMIT = 0.5 GUIDELINE = 80-100 (A4)

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
1991 JAN	352.000		348.000		310.000	313.000	
1991 FEB	11S		11S		314.000	310.700	318.700
1991 APR	347.000		290.000		300.000	317.000	304.000
1991 APR	408.600		233.000		283.000	275.000	278.000
1991 MAY	368.000		295.000		323.000	302.000	305.000
1991 JUN	298.000		270.000		266.000	288.000	304.000
1991 JUL	385.000		292.000		274.000	291.000	289.000
1991 AUG	332.000		326.000		342.000	306.000	316.000
1991 SEP	354.500		337.400		301.800	322.600	325.700
1991 OCT	370.400		313.100		321.300	314.900	316.900
1991 NOV	380.300		320.000		335.800	341.000	332.500
1992 JAN	275.200		305.800		302.600	323.400	339.700
1992 MAY	459.000		291.000		278.000	271.000	267.000
1992 JUL		399.000	357.000	325.000	351.000	389.000	369.000

DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUWADGE WELL SUPPLY

TABLE 4

IONCAL (DMNSLESS)   CHEMISTRY (LABORATORY)

DET'N LIMIT = N/A   GUIDELINE = N/A

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
1991 JAN	3.865		5.157		7.031	3.811	
1991 FEB	.000 NAF		.000 NAF		3.053 NAF	3.158 NAF	.556 NAF
1991 APR	17.760 NAF		12.510 NAF		7.879 NAF	3.097 NAF	2.054 NAF
1991 APR	.632 NAF		3.973 NAF		3.556 NAF	4.291 NAF	2.055 NAF
1991 MAY	3.689		1.190		.379	1.272	1.316
1991 JUN	3.356		3.714		.055	.057	.226
1991 JUL	6.030		1.247		.420	.659	.694
1991 AUG	2.749		2.088		4.132	1.983	1.516
1991 SEP	3.893 NAF		4.088 NAF		3.251 NAF	1.750 NAF	1.194 NAF
1991 OCT	4.442		4.382		3.863	3.142	1.511
1991 NOV	2.390		3.852		1.498	1.266	.460
1992 JAN	42.510		3.652		3.070	2.983	.824
1992 MAY	3.294 NAF		.196		.227 NAF	1.598 NAF	3.261 NAF
1992 JUL		.548	2.487	2.987	4.412	3.854	1.880

POTASSIUM (MG/L)

DET'N LIMIT = 0.01   GUIDELINE = 10 (F2)

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
1991 JAN	2.180		2.730		2.180	1.930	
1991 FEB	!!S		!!S		2.270	2.080	2.230
1991 APR	2.280		2.400		1.910	1.920	1.870
1991 APR	2.500		1.950		1.950	1.800	1.950
1991 MAY	2.300		2.100		2.000	1.850	1.900
1991 JUN	2.550		2.200		1.750	2.000	2.050
1991 JUL	2.400		1.950		1.800	1.850	1.950
1991 AUG	2.400		2.350		2.300	2.100	2.050
1991 SEP	2.340		2.330		1.900	1.920	1.980
1991 OCT	2.480		2.420		2.210	2.060	2.070
1991 NOV	2.340		1.970		1.830	1.970	1.980
1992 JAN	2.050		2.090		2.090	2.200	2.180
1992 MAY	2.470		1.950		1.610	1.680	1.710
1992 JUL		2.620	2.060	1.730	2.000	2.270	2.150

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUWADGE WELL SUPPLY

CHEMISTRY (LABORATORY)

LANGELIERS INDEX (DMNSLESS)

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
	DET'N LIMIT = N/A		DET'N LIMIT = N/A		GUIDELINE = N/A		
1991 JAN	.759	.	.807		1.084	1.041	.
1991 FEB	.		.		1.001	1.054	1.127
1991 APR	.884		1.030		1.045	1.089	1.110
1991 APR	1.243		.808		1.052	1.053	.985
1991 MAY	1.035		.955		1.150	1.093	1.173
1991 JUN	.908		.837		1.019	1.027	1.179
1991 JUL	1.186		.983		1.093	1.132	1.161
1991 AUG	1.048		1.076		1.252	1.157	1.206
1991 SEP	1.115		1.129		1.247	1.240	1.232
1991 OCT	1.058		.953		1.140	1.150	1.205
1991 NOV	1.321		1.254		1.377	1.453	1.536
1992 JAN	1.101		1.226		1.282	1.361	1.367
1992 MAY	1.360		1.018		1.127	1.047	1.103
1992 JUL	.	1.123	1.211	1.175	1.211	1.273	1.401

MAGNESIUM (MG/L)

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
	DET'N LIMIT = 0.1		DET'N LIMIT = 0.1		GUIDELINE = 30.0 (F2)		
1991 JAN	25.100	.	25.430		19.790	17.950	17.600
1991 FEB	!!S		!!S		20.650	18.000	16.800
1991 APR	23.700		18.600		17.600	17.500	16.300
1991 APR	23.600		15.300		17.800	15.800	15.300
1991 MAY	22.600		16.900		17.800	16.400	16.500
1991 JUN	23.800		16.900		15.300	16.200	16.900
1991 JUL	23.500		17.300		15.300	15.900	15.800
1991 AUG	23.500		19.600		19.500	17.100	17.100
1991 SEP	25.250		21.550		17.250	17.750	17.700
1991 OCT	24.300		20.300		19.450	17.400	17.450
1991 NOV	21.000		17.850		18.500	18.950	18.750
1992 JAN	19.300		18.900		18.850	19.750	18.900
1992 MAY	29.500		17.300		15.900	15.600	15.600
1992 JUL	.	20.800	20.500	17.820	20.000	22.700	21.600

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUWADGE WELL SUPPLY

SODIUM (MG/L) — CHEMISTRY (LABORATORY)

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
			DET'N LIMIT = 0.20		GUIDELINE = 200 (A4)		
1991 JAN	23.600		24.700		18.200	15.600	15.100
1991 FEB	IIS		IIS		20.300	15.000	12.600
1991 APR	22.400		16.200		15.000	13.800	9.400
1991 APR	22.300		6.600		15.000	10.600	14.600
1991 MAY	23.400		10.600		17.400	14.600	13.600
1991 JUN	22.400		7.800		10.200	12.200	12.600
1991 JUL	22.800		8.200		10.200	12.200	13.200
1991 AUG	23.800		13.600		19.400	14.000	16.300
1991 SEP	25.200		16.500		14.000	16.200	16.300
1991 OCT	26.500		14.500		21.200	16.300	16.000
1991 NOV	31.700		14.200		14.400	16.000	14.700
1992 JAN	17.650		16.000		18.100	20.300	18.600
1992 MAY	23.200		9.560		9.450	8.530	8.460
1992 JUL		37.100	18.800	15.100	18.900	26.000	22.600

AMMONIUM TOTAL (MG/L)

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
			DET'N LIMIT = 0.002		GUIDELINE = 0.05 (F2)		
1991 JAN	BDL		BDL		BDL	.006 <T	.010
1991 FEB	BDL		BDL		.004 <T	.002 <T	.010
1991 APR	.018		.002 <T		.006 <T	.004 <T	.006 <T
1991 APR	.004 <T		BDL		.004 <T	.002 <T	.006 <T
1991 MAY	.002 <T		.002 <T		.002 <T	.004 <T	.004 <T
1991 JUN	.002 <T		.002 <T		.004 <T	BDL	BDL
1991 JUL	BDL		BDL		BDL	BDL	BDL
1991 AUG	BDL		BDL		BDL	BDL	BDL
1991 SEP	BDL		BDL		BDL	BDL	BDL
1991 OCT	BDL		BDL		BDL	BDL	BDL
1991 NOV	.002 <T		.002 <T		.002 <T	.004 <T	.002 <T
1992 JAN	.002 <T		BDL		.004 <T	.008 <T	.012
1992 MAY	.002 <T		BDL		.014	BDL	.006 <T
1992 JUL			BDL	.004 <T	BDL	BDL	.004 <T

NITRITE (MG/L) — CHEMISTRY (LABORATORY)

DET'N LIMIT = 0.001 GUIDELINE = 1.0 (A1)

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
1991 JAN	.001 <T		BDL		.001 <T	BDL	
1991 FEB	.001 <T		BDL		BDL	BDL	.001 <T
1991 APR	.001 <T		.001 <T		BDL	BDL	.001 <T
1991 APR	.001 <T		BDL		BDL	BDL	.001 <T
1991 MAY	.002 <T		.001 <T		.001 <T	.001 <T	.001 <T
1991 JUN	.002 <T		.001 <T		.001 <T	.001 <T	.001 <T
1991 JUL	.001 <T		BDL		BDL	BDL	.001 <T
1991 AUG	.003 <T		.001 <T		BDL	BDL	.002 <T
1991 SEP	.002 <T		.001 <T		BDL	BDL	.001 <T
1991 OCT	.002 <T		BDL		BDL	BDL	BDL
1991 NOV	.003 <T		.002 <T		.001 <T	.001 <T	BDL
1992 JAN	.008		.003 <T		.002 <T	.002 <T	.002 <T
1992 MAY	.		.001 <T		.002 <T	.001 <T	.003 <T
1992 JUL		.002 <T	.003 <T	.002 <T	.002 <T	.003 <T	.002 <T

NITRATE (TOTAL) (MG/L)

DET'N LIMIT = 0.005 GUIDELINE = 10.0 (A1)

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
1991 JAN	1.040		1.210		.940	.820	
1991 FEB	.920		1.070		.915	.765	.760
1991 APR	1.080		.125		.575	.505	.415
1991 APR	1.100		BDL		.645	.335	.210
1991 MAY	1.120		.070		.760	.555	.565
1991 JUN	1.100		.030		.430	.485	.630
1991 JUL	1.100		.040		.405	.535	.530
1991 AUG	1.120		.210		1.100	.580	.595
1991 SEP	.915		.340		.680	.740	.710
1991 OCT	1.070		.310		1.040	.725	.720
1991 NOV	1.750		.800		.815	.875	.870
1992 JAN	2.020		.820		.880	1.020	.945
1992 MAY	.575		.080		.275	.200	.180
1992 JUL	.	1.430	.930	1.520	1.060	1.070	1.040

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUWADGE WELL SUPPLY

CHEMISTRY (LABORATORY)

NITROGEN TOT KJELD (MG/L)   DET'N LIMIT = 0.02   GUIDELINE = N/A

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
1991 JAN	.170	.	.130	.	.210	.130	.
1991 FEB	.180	.	.130	.	.160	.100	.240
1991 APR	.160	.	.090 <T	.	.100	.090 <T	.170
1991 APR	.150	.	.070 <T	.	.150	.080 <T	.360
1991 MAY	.200	.	.090 <T	.	.170	.130	.280
1991 JUN	.080 <T	.	.070 <T	.	.090 <T	.100	.110
1991 JUL	.180	.	.180	.	.110	.120	.190
1991 AUG	.190	.	.110	.	.180	.140	.160
1991 SEP	.210	.	.110	.	.100	.120	.170
1991 OCT	.160	.	.090 <T	.	.150	.110	.130
1991 NOV	.280	.	.130	.	.140	.130	.170
1992 JAN	.170	.	.150	.	.200	.150	.230
1992 MAY	.200	.	.120	.	.180	.160	.170
1992 JUL	.	.180	.130	.170	.120	.110	.140

PH (DMNSLESS)   DET'N LIMIT = N/A   GUIDELINE = 6.5-8.5 (A4)

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
1991 JAN	7.760	.	7.870	.	8.200	8.130	.
1991 FEB	8.100	.	7.990	.	8.110	8.160	8.220
1991 APR	8.010	.	8.170	.	8.240	8.190	8.250
1991 APR	8.090	.	8.200	.	8.240	8.250	8.200
1991 MAY	7.970	.	8.140	.	8.210	8.220	8.290
1991 JUN	8.110	.	8.100	.	8.270	8.210	8.310
1991 JUL	8.070	.	8.170	.	8.320	8.300	8.330
1991 AUG	8.120	.	8.210	.	8.260	8.280	8.310
1991 SEP	8.120	.	8.060	.	8.390	8.320	8.310
1991 OCT	8.000	.	8.380	.	8.220	8.250	8.300
1991 NOV	8.280	.	8.370	.	8.440	8.500	8.600
1992 JAN	8.230	.	8.240	.	8.410	8.450	8.420
1992 MAY	8.100	.	8.240	.	8.340	8.300	8.360
1992 JUL	.	8.050	.	8.270	8.260	8.220	8.390

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUWADGE WELL SUPPLY

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING

CHEMISTRY (LABORATORY)

PHOSPHORUS FIL REACT (MG/L) DET'N LIMIT = 0.0005 GUIDELINE = N/A

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
1991 JAN	.001 <T	.	BDL	.	.001 <T	.	.
1991 FEB	.001 <T	.	.000 <T	.	.000 <T	.	.
1991 APR	.000 <T	.	BDL	.	.001 <T	.	.
1991 APR	.000 <T	.	BDL	.	.001 <T	.	.
1991 MAY	.000 <T	.	.000 <T	.	.001 <T	.	.
1991 JUN	.000 <T	.	BDL	.	.001 <T	.	.
1991 JUL	BDL	.	BDL	.	.001 <T	.	.
1991 AUG	.000 <T	.	BDL	.	.000 <T	.	.
1991 SEP	.000 <T	.	.000 <T	.	.001 <T	.	.
1991 OCT	.001 <T	.	.000 <T	.	.001 <T	.	.
1991 NOV	BDL	.	BDL	.	BDL	.	.
1992 JAN	BDL	.	BDL	.	.001 <T	.	.
1992 MAY	BDL	.	BDL	.	BDL	.	.
1992 JUL	.	BDL	BDL	BDL	.001 <T	.	.

PHOSPHORUS TOTAL (MG/L) DET'N LIMIT = 0.002 GUIDELINE = 0.40 (F2)

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
1991 JAN	BDL	.	BDL	.	.015	.	.
1991 FEB	.004 <T	.	.002 <T	.	BDL	.	.
1991 APR	BDL	.	BDL	.	BDL	.	.
1991 APR	.004 <T	.	BDL	.	.003 <T	.	.
1991 MAY	BDL	.	.002 <T	.	BDL	.	.
1991 JUN	BDL	.	BDL	.	BDL	.	.
1991 JUL	.002 <T	.	.007 <T	.	.003 <T	.	.
1991 AUG	BDL	.	.004 <T	.	BDL	.	.
1991 SEP	.002 <T	.	BDL	.	BDL	.	.
1991 OCT	.002 <T	.	BDL	.	BDL	.	.
1991 NOV	BDL	.	.003 <T	.	.002 <T	.	.
1992 JAN	BDL	.	BDL	.	BDL	.	.
1992 MAY	.006 <T	.	.018	.	.005 <T	.	.
1992 JUL	.	BDL	BDL	BDL	.003 <T	.	.

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUWADGE WELL SUPPLY

RESIDUE FILTRATE (MG/L) CHEMISTRY (LABORATORY)

GUIDELINE = 500 (A3) DET'N LIMIT = N/A

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
1991 JAN	441.000	.	454.000	.	462.000 CRO	418.000 CRO	.
1991 FEB	542.800	.	565.000	.	481.000 CRO	413.000 CRO	408.000 CRO
1991 APR	517.000 CRO	.	404.000	.	400.000 CRO	385.000 CRO	370.000 CRO
1991 APR	500.000 CRO	.	314.000 CRO	.	395.000 CRO	350.000 CRO	332.000 CRO
1991 MAY	503.000 CRO	.	356.000 CRO	.	408.000 CRO	371.000 CRO	371.000 CRO
1991 JUN	436.000	.	359.000 CRO	.	347.000 CRO	376.000 CRO	395.000 CRO
1991 JUL	!LA	.	371.000 CRO	.	354.000 CRO	378.000 CRO	378.000 CRO
1991 AUG	349.000	.	424.000 CRO	.	478.000 CRO	399.000 CRO	392.000 CRO
1991 SEP	385.000	.	495.000 CRO	.	413.000 CRO	436.000 CRO	431.000 CRO
1991 OCT	321.000	.	461.000 CRO	.	485.000 CRO	424.000 CRO	422.000 CRO
1991 NOV	383.000	.	406.000 CRO	.	427.000 CRO	438.000 CRO	429.000 CRO
1992 JAN	518.000	.	424.000 CRO	.	441.000 CRO	465.000 CRO	448.000 CRO
1992 MAY	564.000	.	351.000 CRO	.	342.000 CRO	334.000 CRO	329.000 CRO
1992 JUL	.	620.000	468.000 CRO	421.000 CRO	456.000 CRO	520.000 CRO	492.000 CRO

SULPHATE (MG/L)

GUIDELINE = 500 (A3) DET'N LIMIT = 0.20

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
1991 JAN	24.940	.	50.620	.	54.440	54.530	.
1991 FEB	22.790	.	49.610	.	38.670	54.430	57.480
1991 APR	27.310	.	71.980	.	52.820	57.480	60.690
1991 APR	28.830	.	72.690	.	48.660	56.940	60.340
1991 MAY	29.300	.	77.170	.	45.810	52.070	50.780
1991 JUN	33.690	.	78.440	.	57.250	59.010	54.510
1991 JUL	32.380	.	80.660	.	61.330	57.710	58.090
1991 AUG	30.190	.	70.470	.	44.660	59.880	58.040
1991 SEP	25.200	.	64.190	.	57.080	56.880	54.240
1991 OCT	23.490	.	46.300	.	45.900	61.100	57.960
1991 NOV	33.980	.	60.620	.	58.680	56.840	57.080
1992 JAN	41.290	.	63.230	.	59.940	54.240	59.740
1992 MAY	22.630	.	86.990	.	62.700	72.650	74.740
1992 JUL	.	58.500	61.230	54.300	60.280	46.650	54.220

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUWADGE WELL SUPPLY

TURBIDITY (FTU)   CHEMISTRY (LABORATORY)   DET'N LIMIT = 0.05   GUIDELINE = 1.0 (A1)

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
1991 JAN	.530	.	.440	.	5.700 RRV	.180 <T	
1991 FEB	.710	.	.540	.	.460	.600	.830
1991 APR	.780	.	.530	.	.260	.280	.370
1991 APR	.740	.	.460	.	.190 <T	.260	.530
1991 MAY	1.130	.	.720	.	.710	.540	.460
1991 JUN	.290	.	.080	.	.140	.130	.150
1991 JUL	.650	.	.630	.	.290	.290	.300
1991 AUG	.490	.	.230	.	.250	.190	.200
1991 SEP	.770	.	.600	.	.240 <T	.270	.270
1991 OCT	.860	.	.310	.	.270	.250	.310
1991 NOV	.490	.	.340	.	.370	.350	.520
1992 JAN	.400	.	.420	.	.270	.400	.260
1992 MAY	1.180	.	.230 <T	.	.260	.240 <T	.630
1992 JUL	.				4.500 USD	.590 USD	.400 USD
	5.100 USD		1.470 USD	1.770 USD			

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUWADGE WELL SUPPLY

SILVER (UG/L) METALS DET'N LIMIT = 0.05 GUIDELINE = N/A

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
1991 JAN	BDL	.	BDL	.	BDL	BDL	.
1991 FEB	BDL	.	BDL	.	BDL	BDL	BDL
1991 APR	BDL	.	BDL	.	BDL	BDL	BDL
1991 APR	BDL	.	BDL	.	BDL	BDL	BDL
1991 MAY	BDL	.	BDL	.	BDL	BDL	BDL
1991 JUN	BDL	.	BDL	.	BDL	BDL	BDL
1991 JUL	BDL	.	BDL	.	BDL	BDL	BDL
1991 AUG	BDL	.	BDL	.	BDL	BDL	BDL
1991 SEP	BDL	.	BDL	.	BDL	BDL	BDL
1991 OCT	BDL	.	BDL	.	BDL	BDL	BDL
1991 NOV	BDL	.	BDL	.	BDL	BDL	.060 <T
1992 JAN	BDL	.	BDL	.	BDL	BDL	BDL
1992 MAY	BDL	.	BDL	.	BDL	BDL	BDL
1992 JUL	.	BDL	BDL	BDL	BDL	BDL	BDL

ALUMINUM (UG/L) DET'N LIMIT = 0.10 GUIDELINE = 100 (A4)

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
1991 JAN	1.300	.	1.400	.	17.000	1.500	.
1991 FEB	1.900	.	2.500	.	2.100	2.000	3.000
1991 APR	2.400	.	2.600	.	2.400	2.100	3.800
1991 APR	2.800	.	2.500	.	2.400	2.400	3.500
1991 MAY	2.300	.	2.200	.	2.200	1.900	2.300
1991 JUN	2.700	.	4.100	.	2.600	3.900	3.400
1991 JUL	13.000	.	2.100	.	2.400	1.800	2.500
1991 AUG	1.600	.	1.600	.	2.000	1.800	1.900
1991 SEP	1.900	.	1.800	.	2.200	2.300	.960 <T
1991 OCT	1.700	.	1.800	.	1.800	1.700	2.400
1991 NOV	3.200	.	1.600	.	2.000	1.800	2.300
1992 JAN	3.500	.	1.000 <T	.	1.500	1.300	1.700
1992 MAY	3.600	.	3.400	.	3.700	3.200	4.200
1992 JUL	.	3.700	3.100	3.100	3.500	3.700	4.300

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUWADGE WELL SUPPLY

ARSENIC (UG/L)

METALS   DET'N LIMIT = 0.10   GUIDELINE = 25 (A1)

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
1991 JAN	1.500		1.500		1.100	.750 <T	.
1991 FEB	.470 <T		.330 <T		.530 <T	.310 <T	.170 <T
1991 APR	BDL		BDL		BDL	BDL	BDL
1991 APR	BDL		.140 <T		BDL	.230 <T	BDL
1991 MAY	BDL		BDL		BDL	BDL	BDL
1991 JUN	.440 <T		.280 <T		.270 <T	.150 <T	.290 <T
1991 JUL	BDL		.210 <T		.170 <T	.300 <T	.220 <T
1991 AUG	.130 <T		.150 <T		.150 <T	.220 <T	.170 <T
1991 SEP	.110 <T		BDL		.180 <T	.160 <T	.170 <T
1991 OCT	.580 <T		.270 <T		.630 <T	.330 <T	.320 <T
1991 NOV	BDL		BDL		BDL	BDL	BDL
1992 JAN	.450 <T		.270 <T		.430 <T	.320 <T	.400 <T
1992 MAY	.500 <T		.240 <T		.250 <T	.120 <T	.370 <T
1992 JUL		.880 <T	.420 <T	.130 <T	.290 <T	.470 <T	.610 <T

BARIUM (UG/L)

DET'N LIMIT = 0.05   GUIDELINE = 1000 (A2)

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
1991 JAN	43.000		48.000		56.000	30.000	30.000
1991 FEB	42.000		48.000		38.000	30.000	28.000
1991 APR	43.000		35.000		31.000	29.000	28.000
1991 APR	43.000		25.000		31.000	26.000	25.000
1991 MAY	45.000		31.000		34.000	29.000	29.000
1991 JUN	47.000		29.000		24.000	28.000	29.000
1991 JUL	42.000		27.000		28.000	25.000	26.000
1991 AUG	44.000		33.000		37.000	28.000	27.000
1991 SEP	48.000		39.000		30.000	31.000	31.000
1991 OCT	48.000		34.000		37.000	28.000	28.000
1991 NOV	40.000		31.000		28.000	32.000	30.000
1992 JAN	52.000		37.000		39.000	41.000	40.000
1992 MAY	52.000		29.000		23.000	25.000	27.000
1992 JUL		48.000	38.000	29.000	37.000	44.000	39.000

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUWADGE WELL SUPPLY

BORON (UG/L)   METALS

DET'N LIMIT = 2.00   GUIDELINE = 5000 (A1)

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
1991 JAN	41.000	.	29.000	.	23.000	15.000 <T	
1991 FEB	28.000	.	15.000 <T	.	38.000	12.000 <T	18.000 <T
1991 APR	60.000	.	18.000 <T	.	37.000	28.000	31.000
1991 APR	51.000	.	15.000 <T	.	16.000 <T	25.000	56.000
1991 MAY	21.000	.	9.200 <T	.	12.000 <T	8.000 <T	9.400 <T
1991 JUN	32.000	.	12.000 <T	.	12.000 <T	13.000 <T	16.000 <T
1991 JUL	21.000	.	9.500 <T	.	12.000 <T	10.000 <T	12.000 <T
1991 AUG	25.000	.	14.000 <T	.	21.000	14.000 <T	15.000 <T
1991 SEP	35.000	.	20.000 <T	.	19.000 <T	30.000	36.000
1991 OCT	66.000	.	15.000 <T	.	48.000	17.000 <T	20.000 <T
1991 NOV	22.000	.	11.000 <T	.	12.000 <T	12.000 <T	13.000 <T
1992 JAN	21.000	.	12.000 <T	.	14.000 <T	15.000 <T	14.000 <T
1992 MAY	32.000	.	11.000 <T	.	9.800 <T	8.300 <T	9.300 <T
1992 JUL	.	27.000	20.000 <T	29.000	14.000 <T	21.000	17.000 <T

BERYLLIUM (UG/L)

DET'N LIMIT = 0.05   GUIDELINE = 6800 (D4)

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
1991 JAN	BDL	.	BDL	.	BDL	BDL	
1991 FEB	BDL	.	BDL	.	BDL	BDL	BDL
1991 APR	.100 <T	.	BDL	.	BDL	BDL	BDL
1991 APR	.080 <T	.	BDL	.	BDL	BDL	BDL
1991 MAY	BDL	.	BDL	.	BDL	BDL	BDL
1991 JUN	BDL	.	BDL	.	BDL	BDL	BDL
1991 JUL	BDL	.	BDL	.	BDL	BDL	BDL
1991 AUG	BDL	.	BDL	.	BDL	BDL	BDL
1991 SEP	.070 <T	.	BDL	.	BDL	BDL	BDL
1991 OCT	.060 <T	.	BDL	.	BDL	BDL	BDL
1991 NOV	BDL	.	BDL	.	BDL	BDL	BDL
1992 JAN	BDL	.	BDL	.	BDL	BDL	BDL
1992 MAY	BDL	.	BDL	.	BDL	BDL	BDL
1992 JUL	.	BDL	BDL	BDL	.	BDL	BDL

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUWADGE WELL SUPPLY

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER OR FREE FLOW	DIST. SYSTEM WARBLER OR STANDING
CADMIUM (UG/L)	METALS)		DET'N LIMIT = 0.05		GUIDELINE = 5.0 (A1)		
1991 JAN	BDL	.	.		.540	BDL	.
1991 FEB	BDL	.	.		.110 <T	BDL	BDL
1991 APR	BDL	.	.		BDL	BDL	.110 <T
1991 APR	BDL	.	.		BDL	BDL	BDL
1991 MAY	BDL	.	.		.090 <T	BDL	BDL
1991 JUN	BDL	.	.		BDL	.060 <T	.080 <T
1991 JUL	BDL	.	.		BDL	BDL	BDL
1991 AUG	BDL	.	.		BDL	BDL	BDL
1991 SEP	BDL	.	.		BDL	BDL	BDL
1991 OCT	BDL	.	.		BDL	BDL	BDL
1991 NOV	BDL	.	.100 <T		.070 <T	.110 <T	BDL
1992 JAN	BDL	.	.		BDL	BDL	BDL
1992 MAY	BDL	.	.		BDL	BDL	.080 <T
1992 JUL	.	BDL	BDL	BDL	BDL	BDL	.080 <T
COBALT (UG/L)	)		DET'N LIMIT = 0.02		GUIDELINE = N/A		
1991 JAN	8.200	.	8.100	.	7.100	6.200	.
1991 FEB	.170 <T	.	.120 <T	.	.120 <T	.150 <T	.180 <T
1991 APR	.220 <T	.	.060 <T	.	.140 <T	.030 <T	.110 <T
1991 APR	.190 <T	.	.060 <T	.	.170 <T	.080 <T	.130 <T
1991 MAY	.320 <T	.	.250 <T	.	BDL	BDL	.100 <T
1991 JUN	.530 <T	.	BDL	.	.260 <T	.290 <T	.350 <T
1991 JUL	.250 <T	.	.080 <T	.	.030 <T	BDL	BDL
1991 AUG	.400 <T	.	.130 <T	.	.220 <T	.100 <T	.170 <T
1991 SEP	.570 <T	.	.050 <T	.	.170 <T	.180 <T	.110 <T
1991 OCT	.330 <T	.	BDL	.	.070 <T	.070 <T	.040 <T
1991 NOV	BDL	.	.210 <T	.	BDL	BDL	BDL
1992 JAN	.080 <T	.	.120 <T	.	.170 <T	.190 <T	.170 <T
1992 MAY	.550 <T	.	.420 <T	.	.250 <T	.030 <T	.200 <T
1992 JUL	.	.500 <T	.420 <T	.340 <T	.420 <T	.510 <T	.510 <T

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUWADGE WELL SUPPLY

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
CHROMIUM (UG/L) METALS			DET'N LIMIT = 0.50		GUIDELINE = 50.0 (A1)		
1991 JAN	12.000		11.000		8.400	3.700 <T	
1991 FEB	.710 <T		BDL		6.100	.680 <T	2.600 <T
1991 APR	10.000		2.200 <T		7.000	5.100	6.100
1991 APR	10.000		2.600 <T		1.300 <T	5.000 <T	5.500
1991 MAY	1.500 <T		1.100 <T		1.200 <T	.720 <T	.950 <T
1991 JUN	5.800		2.300 <T		2.400 <T	2.400 <T	3.000 <T
1991 JUL	.520 <T		BDL		BDL	BDL	BDL
1991 AUG	2.000 <T		3.100 <T		3.500 <T	2.400 <T	2.900 <T
1991 SEP	4.200 <T		2.600 <T		3.000 <T	5.200 <T	5.900
1991 OCT	13.000		1.100 <T		9.700	1.600 <T	2.400 <T
1991 NOV	.830 <T		BDL		BDL	BDL	BDL
1992 JAN	.570 <T		BDL		BDL	BDL	BDL
1992 MAY	.890 <T		BDL		BDL	BDL	BDL
1992 JUL		.890 <T	1.300 <T	3.000 <T	.700 <T	.680 <T	.690 <T
COPPER (UG/L)			DET'N LIMIT = 0.50		GUIDELINE = 1000 (A3)		
1991 JAN	1.900 <T		2.400 <T		16.000	50.000	560.000
1991 FEB	1.400 <T		1.700 <T		1.500 <T	53.000	410.000
1991 APR	1.800 <T		2.000 <T		1.900 <T	71.000	390.000
1991 APR	1.600 <T		1.400 <T		1.800 <T	36.000	130.000
1991 MAY	2.400 <T		2.000 <T		2.200 <T	91.000	1300.000
1991 JUN	1.800 <T		1.900 <T		3.100 <T	120.000	680.000
1991 JUL	2.100 <T		1.700 <T		11.000	160.000	1200.000
1991 AUG	1.600 <T		1.500 <T		1.800 <T	130.000	140.000
1991 SEP	1.700 <T		2.500 <T		2.200 <T	110.000	1100.000
1991 OCT	1.800 <T		1.900 <T		2.000 <T	130.000	1500.000
1991 NOV	1.900 <T		2.100 <T		1.800 <T	140.000	1200.000
1992 JAN	4.100 <T		2.100 <T		1.800 <T	93.000	710.000
1992 MAY	1.300 <T		1.300 <T		1.800 <T	62.000	340.000
1992 JUL		2.600 <T	2.500 <T	2.200 <T	4.400 <T	90.000	

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUWADGE WELL SUPPLY

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
IRON (UG/L)	METALS >		DET'N LIMIT = 6.00		GUIDELINE = 300 (A3)		
1991 JAN	50.000 <T		19.000 <T		BDL	7.000 <T	.
1991 FEB	75.000	.	19.000 <T		24.000 <T	BDL	BDL
1991 APR	79.000		16.000 <T		13.000 <T	9.000 <T	6.900 <T
1991 APR	64.000		23.000 <T		22.000 <T	7.900 <T	12.000 <T
1991 MAY	60.000 <T		36.000 <T		19.000 <T	14.000 <T	19.000 <T
1991 JUN	65.000		8.200 <T		6.300 <T	7.100 <T	12.000 <T
1991 JUL	72.000		22.000 <T		43.000 <T	BDL	7.900 <T
1991 AUG	85.000		9.600 <T		26.000 <T	13.000 <T	13.000 <T
1991 SEP	92.000		37.000 <T		7.700 <T	10.000 <T	BDL
1991 OCT	100.000		49.000 <T		30.000 <T	17.000 <T	14.000 <T
1991 NOV	33.000 <T		23.000 <T		15.000 <T	31.000 <T	34.000 <T
1992 JAN	28.000 <T		BDL		14.000 <T	22.000 <T	15.000 <T
1992 MAY	100.000	.	BDL		23.000 <T	BDL	24.000 <T
1992 JUL	.	6.600 <T	BDL	BDL	8.700 <T	35.000 <T	29.000 <T
MERCURY (UG/L)	>		DET'N LIMIT = 0.02		GUIDELINE = 1.0 (A1)		
43 SAMPLES	BDL	BDL	BDL	BDL	BDL	.	.
MANGANESE (UG/L)	>		DET'N LIMIT = 0.05		GUIDELINE = 50.0 (A3)		
1991 JAN	51.000		8.300		750.000	19.000	18.000
1991 FEB	110.000	.	7.100		51.000	17.000	25.000
1991 APR	280.000		5.400		63.000	33.000	25.000
1991 APR	280.000		4.600		84.000	33.000	30.000
1991 MAY	290.000		5.300		86.000	32.000	33.000
1991 JUN	300.000		7.700		29.000	23.000	32.000
1991 JUL	370.000		8.100		98.000	23.000	23.000
1991 AUG	350.000		8.700		130.000	26.000	38.000
1991 SEP	440.000		7.700		58.000	39.000	26.000
1991 OCT	550.000		8.200		180.000	23.000	26.000
1991 NOV	73.000		48.000		37.000	33.000	68.000
1992 JAN	94.000	.	60.000		82.000	72.000	47.000
1992 MAY	700.000	4.100	17.000		64.000	5.400	47.000
1992 JUL	.		23.000	.570	39.000	60.000	43.000

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUWADGE WELL SUPPLY

METALS

MOLYBDENUM (UG/L)

DET'N LIMIT = 0.05   GUIDELINE = N/A

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
1991 JAN	.170 <T		.320 <T		BDL	.670	
1991 FEB	.220 <T		.320 <T		.350 <T	.580	.730
1991 APR	.300 <T		.520		.590	.710	.740
1991 APR	.330 <T		.660		.470 <T	.630	.900
1991 MAY	.190 <T		.490 <T		.420 <T	.500 <T	.490 <T
1991 JUN	.270 <T		.600		.570	.630	.570
1991 JUL	.370 <T		.560		.650	.610	.620
1991 AUG	.300 <T		.520		.360 <T	.500 <T	.590
1991 SEP	.300 <T		.340 <T		.520	.410 <T	.950
1991 OCT	.280 <T		.380 <T		.490 <T	.680	.590
1991 NOV	.220 <T		.740		.630	.650	.660
1992 JAN	.270 <T		.780		.670	.660	.740
1992 MAY	.540		.900		.850	.680	.800
1992 JUL		.200 <T	.480 <T	.700	.430 <T	.410 <T	.450 <T

NICKEL (UG/L)

DET'N LIMIT = 0.20   GUIDELINE = 350 (03)

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
1991 JAN	28.000		34.000		40.000	25.000	
1991 FEB	BDL		1.300 <T		BDL	.250 <T	1.900 <T
1991 APR	.330 <T		2.200		1.300 <T	1.500 <T	3.200
1991 APR	1.200 <T		1.900 <T		1.300 <T	1.600 <T	3.300
1991 MAY	BDL		BDL		BDL	BDL	BDL
1991 JUN	BDL		.450 <T		BDL	.400 <T	.800 <T
1991 JUL	BDL		BDL		BDL	BDL	BDL
1991 AUG	1.700 <T		.780 <T		.970 <T	.950 <T	1.500 <T
1991 SEP	2.400		2.200		1.600 <T	1.300 <T	1.400 <T
1991 OCT	.790 <T		1.300 <T		.490 <T	.430 <T	1.600 <T
1991 NOV	BDL		BDL		BDL	BDL	BDL
1992 JAN	BDL		BDL		BDL	.990 <T	BDL
1992 MAY	.820 <T		BDL		BDL	BDL	BDL
1992 JUL		.780 <T	1.400 <T	.630 <T	1.200 <T	1.800 <T	2.000 <T

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUWADGE WELL SUPPLY

LEAD (UG/L) — METALS

DET'N LIMIT = 0.05   GUIDELINE = 10 (A1)

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER OR FREE FLOW	DIST. SYSTEM WARBLER OR STANDING
1991 JAN	BDL	.	.090 <T	.	BDL	.340 <T	.
1991 FEB	BDL		BDL		BDL	.270 <T	2.000
1991 APR	BDL		.060 <T		BDL	.250 <T	1.900
1991 APR	BDL		.170 <T		.090 <T	.470 <T	3.300
1991 MAY	BDL		.090 <T		.070 <T	.550	.570
1991 JUN	BDL		BDL		.080 <T	.610	1.600
1991 JUL	.070 <T		.060 <T		2.000	.480 <T	1.700
1991 AUG	BDL		BDL		BDL	.370 <T	1.700
1991 SEP	BDL		.060 <T		.060 <T	.310 <T	.130 <T
1991 OCT	BDL		.100 <T		BDL	.450 <T	1.800
1991 NOV	.120 <T		.110 <T		.070 <T	.270 <T	2.400
1992 JAN	.240 <T		BDL		BDL	.360 <T	1.400
1992 MAY	BDL		.120 <T		BDL	.190 <T	3.500
1992 JUL	.	BDL	BDL	BDL	.160 <T	.370 <T	4.500

ANTIMONY (UG/L)

DET'N LIMIT = 0.05   GUIDELINE = 146 (D4)

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER OR FREE FLOW	DIST. SYSTEM WARBLER OR STANDING
1991 JAN	.390 <T	.	.490 <T	.	.360 <T	.430 <T	.
1991 FEB	.370 <T		.600		.600	.560	.620
1991 APR	.340 <T		.430 <T		.420 <T	.480 <T	.450 <T
1991 APR	.390 <T		.490 <T		.380 <T	.420 <T	.550
1991 MAY	.450 <T		.640		.560	.640	.510
1991 JUN	.690		.720		.510	.650	.720
1991 JUL	.940		.580		.550	.610	.630
1991 AUG	.360 <T		.480 <T		.420 <T	.430 <T	.560
1991 SEP	.470 <T		.470 <T		.400 <T	.470 <T	.520
1991 OCT	.350 <T		.540		.380 <T	.560	.560
1991 NOV	.610		.750		.530	.850	.600
1992 JAN	.500 <T		.770		.390 <T	.440 <T	.550
1992 MAY	.360 <T		.410 <T		.640	.450 <T	.450 <T
1992 JUL	.	.260 <T	.290 <T	.360 <T	.230 <T	.270 <T	.390 <T

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUWADGE WELL SUPPLY

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER OR FREE FLOW	DIST. SYSTEM WARBLER OR STANDING
SELENIUM (UG/L) METALS			GUIDELINE = 10 (A1) DET'N LIMIT = 1.00				
1991 JAN	1.300 <T		2.100 <T		1.600 <T	1.800 <T	.
1991 FEB	BDL		1.200 <T		BDL	BDL	BDL
1991 APR	BDL		BDL .		BDL	BDL	BDL
1991 APR	BDL		BDL		BDL	BDL	1.300 <T
1991 MAY	BDL		BDL		BDL	BDL	BDL
1991 JUN	BDL		BDL		BDL	1.200 <T	1.200 <T
1991 JUL	BDL		BDL		BDL	BDL	BDL
1991 AUG	BDL		BDL		1.200 <T	1.300 <T	BDL
1991 SEP	BDL		BDL		BDL	BDL	BDL
1991 OCT	BDL		BDL		BDL	1.500 <T	1.300 <T
1991 NOV	1.700 <T		1.300 <T		1.400 <T	BDL	2.800 <T
1992 JAN	BDL		BDL		1.100 <T	1.100 <T	BDL
1992 MAY	BDL		BDL		BDL	BDL	BDL
1992 JUL		BDL	BDL	BDL	BDL	1.400 <T	BDL
STRONTIUM (UG/L)			GUIDELINE = N/A DET'N LIMIT = 0.10				
1991 JAN	140.000		160.000		120.000	110.000	.
1991 FEB	140.000		140.000		120.000	100.000	100.000
1991 APR	160.000		120.000		110.000	110.000	100.000
1991 APR	160.000		91.000		110.000	92.000	89.000
1991 MAY	160.000		110.000		120.000	100.000	110.000
1991 JUN	170.000		100.000		92.000	100.000	110.000
1991 JUL	150.000		100.000		100.000	91.000	92.000
1991 AUG	150.000		120.000		120.000	100.000	100.000
1991 SEP	150.000		130.000		100.000	110.000	110.000
1991 OCT	150.000		120.000		120.000	100.000	100.000
1991 NOV	130.000		120.000		99.000	120.000	100.000
1992 JAN	150.000		120.000		130.000	130.000	130.000
1992 MAY	180.000		100.000		96.000	93.000	93.000
1992 JUL		140.000	120.000	110.000	120.000	140.000	130.000

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUWADGE WELL SUPPLY

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
TITANIUM (UG/L)	METALS		DET'N LIMIT = 0.50		GUIDELINE = N/A		
1991 JAN	47.000	.	43.000	.	40.000	37.000	.
1991 FEB	14.000	.	13.000	.	12.000	11.000	11.000
1991 APR	19.000	.	15.000	.	15.000	15.000	14.000
1991 APR	25.000	.	17.000	.	19.000	17.000	17.000
1991 MAY	42.000	.	32.000	.	32.000	32.000	31.000
1991 JUN	15.000	.	11.000	.	10.000	11.000	11.000
1991 JUL	9.900	.	7.700	.	7.700	7.600	7.200
1991 AUG	2.200 <T	.	1.800 <T	.	1.900 <T	1.600 <T	1.600 <T
1991 SEP	2.200 <T	.	1.900 <T	.	1.800 <T	2.000 <T	1.800 <T
1991 OCT	9.000	.	7.200	.	7.300	6.400	6.500
1991 NOV	11.000	.	11.000	.	11.000	11.000	9.900
1992 JAN	6.700	.	6.100	.	5.700	6.200	6.200
1992 MAY	33.000	.	22.000	.	23.000	21.000	23.000
1992 JUL	.	22.000	20.000	19.000	19.000	22.000	21.000
THALLIUM (UG/L)			DET'N LIMIT = 0.05		GUIDELINE = 13 (D4)		
1991 JAN	BDL	.	.070 <T	.	BDL	BDL	BDL
1991 FEB	BDL	.	BDL	.	BDL	BDL	BDL
1991 APR	BDL	.	BDL	.	BDL	BDL	BDL
1991 APR	BDL	.	BDL	.	BDL	BDL	BDL
1991 MAY	BDL	.	BDL	.	BDL	BDL	BDL
1991 JUN	BDL	.	.070 <T	.	BDL	BDL	BDL
1991 JUL	BDL	.	BDL	.	BDL	BDL	BDL
1991 AUG	BDL	.	BDL	.	BDL	BDL	BDL
1991 SEP	BDL	.	BDL	.	BDL	BDL	BDL
1991 OCT	BDL	.	BDL	.	BDL	BDL	BDL
1991 NOV	BDL	.	.070 <T	.	.070 <T	.150 <T	.120 <T
1992 JAN	BDL	.	BDL	.	BDL	BDL	BDL
1992 MAY	BDL	.	BDL	.	BDL	BDL	BDL
1992 JUL	.	BDL	.070 <T	.070 <T	BDL	BDL	BDL

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUWADGE WELL SUPPLY

URANIUM (UG/L)

METALS
DET'N LIMIT = 0.05 GUIDELINE = 100 (A1)

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER OR STANDING
1991 JAN	.980	.	2.800	.	2.100	2.000	.
1991 FEB	.920	.	2.800	.	1.400	1.900	2.000
1991 APR	.890	.	2.300	.	1.500	1.600	1.800
1991 APR	.940	.	2.200	.	1.300	1.700	1.700
1991 MAY	.900	.	2.400	.	1.300	1.500	1.500
1991 JUN	1.000	.	2.500	.	1.800	1.800	1.700
1991 JUL	.850	.	2.400	.	1.500	1.600	1.500
1991 AUG	.880	.	2.400	.	1.200	1.700	1.800
1991 SEP	.870	.	2.700	.	1.600	1.600	1.800
1991 OCT	.880	.	2.600	.	1.400	1.500	1.500
1991 NOV	.940	.	1.600	.	1.900	1.700	1.800
1992 JAN	1.300	.	2.400	.	2.300	2.300	2.400
1992 MAY	1.000	.	2.400	.	1.400	2.000	1.900
1992 JUL	.	.870	2.100	1.700	2.100	1.700	2.000

VANADIUM (UG/L)

DET'N LIMIT = 0.05 GUIDELINE = N/A

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER OR STANDING
1991 JAN	.720	.	1.000	.	1.700	.650	.
1991 FEB	.310 <T	.	.490 <T	.	.340 <T	.340 <T	.360 <T
1991 APR	BDL	.	.140 <T	.	.130 <T	.060 <T	.100 <T
1991 APR	.200 <T	.	.350 <T	.	.310 <T	.300 <T	.310 <T
1991 MAY	BDL	.	.430 <T	.	.190 <T	.260 <T	.270 <T
1991 JUN	BDL	.	.250 <T	.	.160 <T	.160 <T	.070 <T
1991 JUL	BDL	.	.070 <T	.	BDL	BDL	BDL
1991 AUG	.240 <T	.	.310 <T	.	.320 <T	.380 <T	.310 <T
1991 SEP	.200 <T	.	.390 <T	.	.420 <T	.340 <T	.350 <T
1991 OCT	.160 <T	.	.330 <T	.	.240 <T	.180 <T	.200 <T
1991 NOV	BDL	.	.250 <T	.	.150 <T	.200 <T	.120 <T
1992 JAN	.220 <T	.	.380 <T	.	.380 <T	.330 <T	.320 <T
1992 MAY	.240 <T	.	.310 <T	.	.310 <T	.310 <T	.360 <T
1992 JUL	.	.260 <T	.440 <T	.310 <T	.410 <T	.370 <T	.420 <T

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUWADGE WELL SUPPLY

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
ZINC (UG/L) METALS			DET'N LIMIT = 0.20		GUIDELINE = 5000 (A3)		
1991 JAN	2.300	.	8.200	.	70.000	11.000	.
1991 FEB	1.700 <T	.	4.500	.	2.300	5.000	50.000
1991 APR	1.100 <T	.	5.000	.	3.400	4.800	34.000
1991 APR	1.600 <T	.	6.300	.	3.800	4.400	29.000
1991 MAY	4.100	.	12.000	.	4.500	7.700	9.900
1991 JUN	1.800 <T	.	4.100	.	3.500	6.700	15.000
1991 JUL	1.500 <T	.	6.000	.	4.800	5.400	13.000
1991 AUG	BDL	.	1.500 <T	.	.420 <T	2.500	8.800
1991 SEP	.650 <T	.	4.000	.	1.900 <T	2.700	.590 <T
1991 OCT	.840 <T	.	5.600	.	1.700 <T	3.700	9.500
1991 NOV	1.500 <T	.	4.300	.	3.200	4.300	15.000
1992 JAN	6.800	.	4.300	.	4.100	5.400	15.000
1992 MAY	.460 <T	.	3.300	.	3.700	5.700	29.000
1992 JUL	.	2.300	5.500	2.500	5.300	4.700	16.000

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUWADGE WELL SUPPLY

CHLOROAROMATICS

Parameter	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
HEXACHLOROBUTADIENE (NG/L)	BDL	BDL	DET'N LIMIT = 1.000	BDL	GUIDELINE = 450 (D4) / BDL	BDL	.
33 SAMPLES	BDL	BDL					
123-TRICHLOROBENZENE (NG/L)	BDL	BDL	DET'N LIMIT = 5.000	.BDL	GUIDELINE = N/A / BDL	BDL	.
33 SAMPLES	BDL	BDL					
1234-TETCLOROBENZENE (NG/L)	BDL	BDL	DET'N LIMIT = 1.000	BDL	GUIDELINE = N/A / BDL	BDL	.
33 SAMPLES	BDL	BDL					
1235-TETCLOROBENZENE (NG/L)	BDL	BDL	DET'N LIMIT = 1.000	BDL	GUIDELINE = N/A / BDL	BDL	.
33 SAMPLES	BDL	BDL					
124-TRICHLOROBENZENE (NG/L)	BDL	BDL	DET'N LIMIT = 5.000	BDL	GUIDELINE = 10000 (1) / BDL	BDL	.
33 SAMPLES	BDL	BDL					
1245-TETCLOROBENZENE (NG/L)	BDL	BDL	DET'N LIMIT = 1.000	BDL	GUIDELINE = 38000 (D4) / BDL	BDL	.
33 SAMPLES	BDL	BDL					
135-TRICHLOROBENZENE (NG/L)	BDL	BDL	DET'N LIMIT = 5.000	BDL	GUIDELINE = N/A / BDL	BDL	.
33 SAMPLES	BDL	BDL					
HEXACHLOROBENZENE (NG/L)	BDL	BDL	DET'N LIMIT = 1.000	BDL	GUIDELINE = 10 (C1) / BDL	BDL	.
33 SAMPLES	BDL	BDL					
HEXACHLOROETHANE (NG/L)	BDL	BDL	DET'N LIMIT = 1.000	BDL	GUIDELINE = 1900 (D4) / BDL	BDL	.
33 SAMPLES	BDL	BDL					
OCTACHLOROSTYRENE (NG/L)	BDL	BDL	DET'N LIMIT = 1.000	BDL	GUIDELINE = N/A / BDL	BDL	.
33 SAMPLES	BDL	BDL					
PENTACHLOROBENZENE (NG/L)	BDL	BDL	DET'N LIMIT = 1.000	BDL	GUIDELINE = 74000 (D4) / BDL	BDL	.
33 SAMPLES	BDL	BDL					
236-TRICHLOROTOLUENE (NG/L)	BDL	BDL	DET'N LIMIT = 5.000	BDL	GUIDELINE = N/A / BDL	BDL	.
33 SAMPLES	BDL	BDL					

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUWADGE WELL SUPPLY

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
CHLOROAROMATICS							
245-TRICHLOROTOLUENE (NG/L)			DET'N LIMIT = 5.000		GUIDELINE = N/A		
33 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	.
26A-TRICHLOROTOLUENE (NG/L)			DET'N LIMIT = 5.000		GUIDELINE = N/A		
33 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	.

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUWADGE WELL SUPPLY

PESTICIDES AND PCB

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER OR FREE FLOW	DIST. SYSTEM WARBLER OR STANDING
ALDRIN (NG/L)			DET'N LIMIT = 1.000		GUIDELINE = 700 (A1)		.
33 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	
ALPHA BHC (NG/L)			DET'N LIMIT = 1.000		GUIDELINE = 700 (G)		.
33 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	
BETA BHC (NG/L)			DET'N LIMIT = 1.00		GUIDELINE = 300 (G)		.
33 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	
LINDANE (GAMMA BHC) (NG/L)			DET'N LIMIT = 1.000		GUIDELINE = 4000 (A1)		.
33 SAMPLES -	BDL	BDL	BDL	BDL	BDL	BDL	
ALPHA CHLORDANE (NG/L)			DET'N LIMIT = 2.000		GUIDELINE = 7000 (A1)		.
33 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	
GAMMA CHLORDANE (NG/L)			DET'N LIMIT = 2.00		GUIDELINE = 7000 (A1)		.
33 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	
DIELDRIN (NG/L)			DET'N LIMIT = 2.00		GUIDELINE = 700 (A1)		.
33 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	
METHOXYCHLOR (NG/L)			DET'N LIMIT = 5.0		GUIDELINE = 900000 (A1)		.
33 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	
ENDOSULFAN 1 (NG/L)			DET'N LIMIT = 2.00		GUIDELINE = 74000 (D4)		.
33 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	
ENDOSULFAN II (NG/L)			DET'N LIMIT = 5.000		GUIDELINE = 74000 (D4)		.
33 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	
ENDRIN (NG/L)			DET'N LIMIT = 5.000		GUIDELINE = 1600 (D3)		.
33 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	
ENDOSULFAN SULPHATE (NG/L)			DET'N LIMIT = 5.00		GUIDELINE = N/A		.
33 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUWADGE WELL SUPPLY

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
PESTICIDES AND PCB							
HEPTACHLOR EPOXIDE (NG/L)			DET'N LIMIT = 1.000		GUIDELINE = 3000 (A1)		
27 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	.
HEPTACHLOR (NG/L)			DET'N LIMIT = 1.000		GUIDELINE = 3000 (A1)		
33 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	.
MIREX (NG/L)			DET'N LIMIT = 5.000		GUIDELINE = N/A		
33 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	.
OXYCHLORDANE (NG/L)			DET'N LIMIT = 2.000		GUIDELINE = N/A		
33 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	.
O,P-DDT (NG/L)			DET'N LIMIT = 5.000		GUIDELINE = 30000 (A1)		
33 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	.
PCB (NG/L)			DET'N LIMIT = 20.00		GUIDELINE = 3000 (A2)		
33 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	.
P,P-DDD (NG/L)			DET'N LIMIT = 5.000		GUIDELINE = 30000 (A1)		
33 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	.
P,P-DDE (NG/L)			DET'N LIMIT = 1.000		GUIDELINE = 30000 (A1)		
33 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	.
P,P-DDT (NG/L)			DET'N LIMIT = 5.000		GUIDELINE = 30000 (A1)		
33 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	.
TOXAPHENE (NG/L)			DET'N LIMIT = 500.0		GUIDELINE = 5000 (A1)		
33 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	.
AMETRINE (NG/L)			DET'N LIMIT = 50.0		GUIDELINE = 300000 (D3)		
28 SAMPLES	BDL	BDL	BDL	BDL	BDL	.	.
ATRAZINE (NG/L)			DET'N LIMIT = 50.0		GUIDELINE = 60000 (A2)		
28 SAMPLES	BDL	BDL	BDL	BDL	BDL	.	.

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUWADGE WELL SUPPLY

PESTICIDES AND PCB

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
ATRATONE (NG/L)	)			DET'N LIMIT = 50.0	GUIDELINE = N/A		.
28 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	.
CYANAZINE (BLADEX) (NG/L)	)			DET'N LIMIT = 100.0	GUIDELINE = 10000 (A2)		.
28 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	.
DESETHYL ATRAZINE (NG/L)	)			DET'N LIMIT = 200.0	GUIDELINE = 60000 (A2)		.
28 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	.
DESETHYL SIMAZINE (NG/L)	)			DET'N LIMIT = 200.0	GUIDELINE = 10000 (A2)		.
28 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	.
PROMETONE (NG/L)	)			DET'N LIMIT = 50.000	GUIDELINE = 52500 (D3)		.
28 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	.
PROPAZINE (NG/L)	)			DET'N LIMIT = 50.000	GUIDELINE = 700000 (D3)		.
28 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	.
PROMETRYNE (NG/L)	)			DET'N LIMIT = 50.000	GUIDELINE = 1000 (A2)		.
28 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	.
METRIBUZIN (SENCOR) (NG/L)	)			DET'N LIMIT = 100.0	GUIDELINE = 80000 (A1)		.
28 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	.
SIMAZINE (NG/L)	)			DET'N LIMIT = 50.00	GUIDELINE = 10000 (A2)		.
28 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	.
ALACHLOR (LASSO) (NG/L)	)			DET'N LIMIT = 500.0	GUIDELINE = 5000 (A2)		.
28 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	.
METOLACHLOR (NG/L)	)			DET'N LIMIT = 500.0	GUIDELINE = 50000 (A2)		.
28 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUWADGE WELL SUPPLY

PESTICIDES AND PCB

HEXACLCYCLOPENTADIEN (NG/L) DET'N LIMIT = 5.00   GUIDELINE = 206000 (D4)

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
1991 JAN	BDL	.	BDL	.	BDL	BDL	.
1991 FEB	BDL	.	BDL	.	BDL	BDL	.
1991 APR	BDL	.	BDL	.	6.000 <T	19.000 <T	.
1991 APR	BDL	.	BDL	.	17.000 <T	26.000 <T	.
1991 MAY	BDL	.	!LA	.	BDL	!LA	.
1991 JUN	!AW	.	!AW	.	!AW	!AW	.
1991 JUL	!AW	.	!AW	.	!AW	!AW	.
1991 AUG	!AW	.	!AW	.	!AW	!AW	.
1991 SEP	!AW	.	!AW	.	!AW	!AW	.
1991 OCT	!QU	.	BDL	.	!QU	BDL	.
1991 NOV	BDL	.	BDL	.	BDL	BDL	.
1992 JAN	!QU	.	!QU	.	!QU	!QU	.
1992 MAY	!QU	.	!QU	.	!QU	!QU	.
1992 JUL	.	!QU	!QU	!QU	!QU	!QU	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUWADGE WELL SUPPLY

PHENOLICS (UG/L)

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
PHENOLICS			DET'N LIMIT =	0.2	GUIDELINE = N/A		
1991 JAN	.800 <T	.	.600 <T	.	.800 <T	.	.
1991 FEB	.200 <T	.	BDL	.	BDL	.	.
1991 APR	BDL	.	BDL	.	BDL	.	.
1991 APR	BDL	.	BDL	.	BDL	.	.
1991 MAY	BDL	.	BDL	.	BDL	.	.
1991 JUN	.200 <T	.	.200 <T	.	.400 <T	.	.
1991 JUL	BDL	.	.400 <T	.	.400 <T	.	.
1991 AUG	.200 <T	.	.200 <T	.	.200 <T	.	.
1991 SEP	1.000	.	1.400	.	1.400	.	.
1991 OCT	.400 <T	.	.400 <T	.	BDL	.	.
1991 NOV	BDL	.	BDL	.	BDL	.	.
1992 JAN	.600 <T	.	.800 <T	.	.400 <T	.	.
1992 MAY	BDL	.	BDL	.	.400 <T	.	.
1992 JUL	.	BDL	IRE	BDL	BDL	.	.

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUWADGE WELL SUPPLY

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
POLYAROMATIC HYDROCARBONS							
PHENANTHRENE (NG/L)		.	DET'N LIMIT = 10.0	.	GUIDELINE = N/A		.
20 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	.
ANTHRACENE (NG/L)		.	DET'N LIMIT = 1.0	.	GUIDELINE = N/A		.
20 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	.
FLUORANTHENE (NG/L)		.	DET'N LIMIT = 20.0	.	GUIDELINE = 42000 (D4)		.
20 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	.
PYRENE (NG/L)		.	DET'N LIMIT = 20.0	.	GUIDELINE = N/A		.
20 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	.
BENZO(A)ANTHRACENE (NG/L)		.	DET'N LIMIT = 20.0	.	GUIDELINE = N/A		.
20 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	.
CHRYSENE (NG/L)		.	DET'N LIMIT = 50.0	.	GUIDELINE = N/A		.
20 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	.
DIMETH. BENZ(A)ANTHR (NG/L)		.	DET'N LIMIT = 5.0	.	GUIDELINE = N/A		.
16 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	.
BENZO(E) PYRENE (NG/L)		.	DET'N LIMIT = 50.0	.	GUIDELINE = N/A		.
20 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	.
BENZO(B) FLUORANTHEN (NG/L)		.	DET'N LIMIT = 10.0	.	GUIDELINE = N/A		.
20 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	.
PERYLENE (NG/L)		.	DET'N LIMIT = 10.0	.	GUIDELINE = N/A		.
20 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	.
BENZO(K) FLUORANTHEN (NG/L)		.	DET'N LIMIT = 1.0	.	GUIDELINE = N/A		.
20 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	.
BENZO(A) PYRENE (NG/L)		.	DET'N LIMIT = 5.0	.	GUIDELINE = 10 (A1)		.
20 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	.

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUWADGE WELL SUPPLY

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
POLYAROMATIC HYDROCARBONS							
BENZO(G,H,I) PERYLEN (NG/L) >			DET'N LIMIT = 20.0		GUIDELINE = N/A		
20 SAMPLES	BDL				BDL	BDL	
DIBENZO(A,H) ANTHRAC (NG/L) >			DET'N LIMIT = 10.0		GUIDELINE = N/A		
20 SAMPLES	BDL				BDL	BDL	
INDENO(1,2,3-C,D) PY (NG/L) >			DET'N LIMIT = 20.0		GUIDELINE = N/A		
20 SAMPLES	BDL				BDL	BDL	
BENZO(B) CHRYSENE (NG/L) >			DET'N LIMIT = 2.0		GUIDELINE = N/A		
20 SAMPLES	BDL				BDL	BDL	
CORONENE (NG/L) >			DET'N LIMIT = 10.D		GUIDELINE = N/A		
20 SAMPLES	BDL				BDL	BDL	

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUWADGE WELL SUPPLY

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
BENZENE (UG/L) VOLATILES)			DET'N LIMIT = 0.05		GUIDELINE = 5 (A1)		
1991 JAN	BDL	.	BDL	.	BDL	BDL	.
1991 FEB	BDL	.	BDL	.	BDL	BDL	.
1991 APR	BDL	.	BDL	.	BDL	BDL	.
1991 APR	BDL	.	BDL	.	BDL	BDL	.
1991 MAY	BDL	.	BDL	.	.150 <T	BDL	.
1991 JUN	BDL	.	BDL	.	.150 <T	BDL	.
1991 JUL	BDL	.	BDL	.	.050 <T	BDL	.
1991 AUG	BDL	.	BDL	.	BDL	BDL	.
1991 SEP	BDL	.	BDL	.	BDL	BDL	.
1991 OCT	BDL	.	BDL	.	BDL	BDL	.
1991 NOV	BDL	.	BDL	.	BDL	BDL	.
1992 JAN	BDL	.	BDL	.	BDL	BDL	.
1992 MAY	BDL	.	BDL	.	BDL	BDL	.
1992 JUL	.	BDL	BDL	BDL	BDL	BDL	.

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
TOLUENE (UG/L))			DET'N LIMIT = 0.05		GUIDELINE = 24 (A3)		
1991 JAN	BDL	BDL	BDL	.	BDL	BDL	.
1991 FEB	BDL	BDL	BDL	.	BDL	BDL	.
1991 APR	BDL	BDL	BDL	.	BDL	BDL	.
1991 APR	BDL	BDL	BDL	.	BDL	BDL	.
1991 MAY	BDL	BDL	BDL	.	.300 <T	.100 <T	.
1991 JUN	BDL	BDL	BDL	.	.250 <T	BDL	.
1991 JUL	BDL	BDL	BDL	.	.150 <T	BDL	.
1991 AUG	BDL	BDL	BDL	.	BDL	BDL	.
1991 SEP	BDL	BDL	BDL	.	.050 <T	BDL	.
1991 OCT	BDL	BDL	BDL	.	BDL	BDL	.
1991 NOV	BDL	BDL	.100 <T	.	.050 <T	.050 <T	.
1992 JAN	BDL	BDL	BDL	.	BDL	.050 <T	.
1992 MAY	BDL	BDL	BDL	.	BDL	BDL	.
1992 JUL	.	.	BDL	BDL	BDL	BDL	.

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUWADGE WELL SUPPLY

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
ETHYLBENZENE (UG/L) VOLATILES			DET'N LIMIT = 0.05		GUIDELINE = 2.4 (A3)		
1991 JAN	BDL	.	BDL	.	BDL	BDL	.
1991 FEB	BDL	.	.050 <T	.	BDL	BDL	.
1991 APR	.050 <T	.	.100 <T	.	BDL	BDL	.
1991 APR	.100 <T	.	BDL	.	BDL	BDL	.
1991 MAY	.050 <T	.	BDL	.	.100 <T	BDL	.
1991 JUN	BDL	.	BDL	.	.150 <T	.050 <T	.
1991 JUL	BDL	.	BDL	.	.150 <T	.100 <T	.
1991 AUG	BDL	.	.100 <T	.	BDL	BDL	.
1991 SEP	.100 <T	.	BDL	.	.050 <T	.100 <T	.
1991 OCT	.050 <T	.	.050 <T	.	.100 <T	BDL	.
1991 NOV	BDL	.	BDL	.	.050 <T	.150 <T	.
1992 JAN	BDL	.	BDL	.	.050 <T	BDL	.
1992 MAY	.150 <T	.	.100 <T	.	.100 <T	.100 <T	.
1992 JUL	.	.150 <T	.150 <T	.150 <T	.100 <T	.100 <T	.

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
P-XYLENE (UG/L)			DET'N LIMIT = 0.10		GUIDELINE = 300 (A3*)		
57 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	.

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
M-XYLENE (UG/L)			DET'N LIMIT = 0.10		GUIDELINE = 300 (A3*)		
1991 JAN	BDL	.	BDL	.	BDL	BDL	.
1991 FEB	BDL	.	BDL	.	BDL	BDL	.
1991 APR	BDL	.	BDL	.	BDL	BDL	.
1991 APR	BDL	.	BDL	.	BDL	BDL	.
1991 MAY	BDL	.	BDL	.	.300 <T	BDL	.
1991 JUN	BDL	.	BDL	.	BDL	BDL	.
1991 JUL	BDL	.	BDL	.	BDL	BDL	.
1991 AUG	BDL	.	BDL	.	BDL	BDL	.
1991 SEP	BDL	.	BDL	.	BDL	BDL	.
1991 OCT	BDL	.	BDL	.	BDL	BDL	.
1991 NOV	BDL	.	BDL	.	BDL	BDL	.
1992 JAN	BDL	.	BDL	.	BDL	BDL	.
1992 MAY	BDL	.	BDL	.	BDL	BDL	.
1992 JUL	.	BDL	BDL	BDL	BDL	BDL	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUWADGE WELL SUPPLY

O-XYLENE (UG/L) — VOLATILES — DET'N LIMIT = 0.05 — GUIDELINE = 300 (A3*)

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
1991 JAN	BDL	.	BDL	.	BDL	BDL	.
1991 FEB	BDL	.	BDL	.	BDL	BDL	.
1991 APR	BDL	.	BDL	.	BDL	BDL	.
1991 APR	BDL	.	BDL	.	BDL	BDL	.
1991 MAY	BDL	.	BDL	.	.150 <T	BDL	.
1991 JUN	BDL	.	BDL	.	.050 <T	BDL	.
1991 JUL	BDL	.	BDL	.	BDL	BDL	.
1991 AUG	BDL	.	BDL	.	BDL	BDL	.
1991 SEP	BDL	.	BDL	.	BDL	BDL	.
1991 OCT	BDL	.	BDL	.	BDL	BDL	.
1991 NOV	BDL	.	BDL	.	BDL	BDL	.
1992 JAN	BDL	.	BDL	.	BDL	BDL	.
1992 MAY	BDL	.	BDL	.	BDL	BDL	.
1992 JUL	.	BDL	BDL	BDL	BDL	BDL	.

STYRENE (UG/L) — DET'N LIMIT = 0.05 — GUIDELINE = 100 (D1)

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
1991 JAN	BDL	.	BDL	.	BDL	BDL	.
1991 FEB	BDL	.	.150 <T	.	BDL	BDL	.
1991 APR	.100 <T	.	.150 <T	.	.050 <T	.100 <T	.
1991 APR	.100 <T	.	.050 <T	.	.100 <T	BDL	.
1991 MAY	.050 <T	.	BDL	.	BDL	BDL	.
1991 JUN	BDL	.	BDL	.	.250 <T	BDL	.
1991 JUL	BDL	.	BDL	.	.200 <T	.050 <T	.
1991 AUG	BDL	.	BDL	.	BDL	BDL	.
1991 SEP	.150 <T	.	.150 <T	.	.100 <T	.200 <T	.
1991 OCT	.050 <T	.	BDL	.	.100 <T	BDL	.
1991 NOV	.100 <T	.	.200 <T	.	.150 <T	.300 <T	.
1992 JAN	.100 <T	.	.050 <T	.	.100 <T	.100 <T	.
1992 MAY	.350 <T	.	.250 <T	.	.200 <T	.100 <T	.
1992 JUL	.	.200 <T	.250 <T	.250 <T	.200 <T	.200 <T	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUWADGE WELL SUPPLY

VOLATILES

1,1-DICHLOROETHYLENE (UG/L) DET'N LIMIT = 0.100 GUIDELINE = 7 (D1)

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
57 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	

METHYLENE CHLORIDE (UG/L) DET'N LIMIT = 0.50 GUIDELINE = 50 (A1)

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
1991 JAN	BDL		BDL		BDL	BDL	
1991 FEB	BDL		BDL		BDL	BDL	
1991 APR	BDL		BDL		BDL	BDL	
1991 APR	BDL		BDL		BDL	BDL	
1991 MAY	BDL		BDL		BDL	BDL	
1991 JUN	BDL		BDL		BDL	BDL	
1991 JUL	BDL		BDL		BDL	BDL	
1991 AUG	BDL		BDL		BDL	BDL	
1991 SEP	BDL		BDL		BDL	BDL	
1991 OCT	BDL		BDL		BDL	BDL	
1991 NOV	BDL		BDL		BDL	BDL	
1992 JAN	BDL		BDL		BDL	BDL	
1992 MAY	1.500 UCS		2.500 UCS		3.500 UCS	7.500 UCS	
1992 JUL		BDL	BDL	BDL	BDL	BDL	

T12-DICHLOROETHYLENE (UG/L) DET'N LIMIT = 0.10 GUIDELINE = 70 (D1)

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
57 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	

1,1-DICHLOROETHANE (UG/L) DET'N LIMIT = 0.10D GUIDELINE = N/A

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
57 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	

CHLOROFORM (UG/L) DET'N LIMIT = 0.10 GUIDELINE = 350 (A1+)

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
1991 JAN	BDL		BDL		3.100	4.700	
1991 FEB	BDL		BDL		2.800	4.700	
1991 APR	.200 <T		BDL		9.000	16.500	
1991 APR	.200 <T		BDL		10.700	20.800	
1991 MAY	.300 <T		BDL		7.900	14.300	
1991 JUN	.200 <T		BDL		36.400	17.900	
1991 JUL	.200 <T		BDL		30.500	21.100	
1991 AUG	.200 <T		BDL		4.000	15.300	
1991 SEP	BDL		BDL		27.300	20.700	
1991 OCT	BDL		BDL		36.900	33.200	
1991 NOV	.200 <T		.200 <T		.200 <T	.300 <T	
1992 JAN	.300 <T		BDL		28.100	14.800	
1992 MAY	.200 <T		BDL		1.300	1.100	
1992 JUL		1.700	.400 <T	.500 <T	15.700	13.100	

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUWADGE WELL SUPPLY

VOLATILES

111, TRICHLOROETHANE (UG/L)

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW (DET'N LIMIT = 0.02)	WELL 4 RAW	RESERVOIR TREATED (GUIDELINE = 200 (D1))	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
1991 JAN	.340		.060 <T		.040 <T	BDL	.
1991 FEB	.100 <T		.060 <T		.060 <T	.040 <T	.
1991 APR	.060 <T		.040 <T		.040 <T	BDL	.
1991 APR	.060 <T		BDL		.040 <T	BDL	.
1991 MAY	.100 <T		.060 <T		.040 <T	BDL	.
1991 JUN	.120 <T		BDL		BDL	BDL	.
1991 JUL	.100 <T		BDL		BDL	BDL	.
1991 AUG	.100 <T		BDL		.040 <T	BDL	.
1991 SEP	.100 <T		BDL		BDL	BDL	.
1991 OCT	.100 <T		BDL		BDL	BDL	.
1991 NOV	.140 <T		.040 <T		BDL	BDL	.
1992 JAN	.460		BDL		BDL	BDL	.
1992 MAY	BDL		BDL		BDL	BDL	.
1992 JUL	.	.080 <T	BDL	BDL	BDL	BDL	.

1,2 DICHLOROETHANE (UG/L)

DET'N LIMIT = 0.05   GUIDELINE = 5 (A1)

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
57 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	.

CARBON TETRACHLORIDE (UG/L)

DET'N LIMIT = C.20   GUIDELINE = 5 (A1)

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
57 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	.

1,2-DICHLOROPROPANE (UG/L)

DET'N LIMIT = 0.05   GUIDELINE = 5 (D1)

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
57 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	.

TRICHLOROETHYLENE (UG/L)

DET'N LIMIT = 0.10   GUIDELINE = 50 (A1)

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
1991 JAN	BDL		BDL		BDL	BDL	.
1991 FEB	BDL		.100 <T		BDL	BDL	.
1991 APR	BDL		.100 <T		BDL	BDL	.
1991 APR	BDL		.100 <T		BDL	BDL	.
1991 MAY	BDL		.100 <T		BDL	BDL	.
1991 JUN	BDL		BDL		BDL	BDL	.
1991 JUL	BDL		.100 <T		BDL	BDL	.
1991 AUG	BDL		.100 <T		BDL	BDL	.
1991 SEP	BDL		.200 <T		BDL	BDL	.
1991 OCT	BDL		.200 <T		BDL	BDL	.
1991 NOV	BDL		BDL		BDL	BDL	.
1992 JAN	BDL		BDL		BDL	BDL	.
1992 MAY	BDL		BDL		BDL	BDL	.
1992 JUL		BDL	BDL	BDL	BDL	BDL	.

DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUWADGE WELL SUPPLY

TABLE 4

VOLATILES

DICHLOROBROMOMETHANE (UG/L)   DET'N LIMIT = 0.05   GUIDELINE = 350 (A1+)

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
1991 JAN	BDL				1.900	1.850	
1991 FEB	BDL				2.000	1.900	
1991 APR	BDL				3.000	4.150	
1991 APR	BDL				3.450	3.800	
1991 MAY	.100 <T				3.300	3.650	
1991 JUN	BDL				5.150	3.400	
1991 JUL	BDL				5.200	3.800	
1991 AUG	BDL				1.600	4.250	
1991 SEP	BDL				8.200	5.900	
1991 OCT	BDL				9.700	7.700	
1991 NOV	BDL				BDL	BDL	
1992 JAN	BDL				12.500	7.700	
1992 MAY	BDL				BDL	BDL	
1992 JUL		.300 <T		BDL	6.000	5.800	

112-TRICHLOROETHANE (UG/L)   DET'N LIMIT = 0.05   GUIDELINE = 0.6 (D4)

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
57 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	

CHLORODIBROMOMETHANE (UG/L)   DET'N LIMIT = 0.10   GUIDELINE = 350 (A1+)

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
1991 JAN	BDL		BDL	BDL	.800 <T	BDL	
1991 FEB	BDL		BDL	BDL	.900 <T	.400 <T	
1991 APR	BDL		BDL	BDL	.600 <T	.700 <T	
1991 APR	BDL		BDL	BDL	.800 <T	.800 <T	
1991 MAY	BDL		BDL	BDL	1.000 <T	.800 <T	
1991 JUN	BDL		BDL	BDL	.500 <T	.400 <T	
1991 JUL	BDL		BDL	BDL	.400 <T	.500 <T	
1991 AUG	BDL		BDL	BDL	.300 <T	.700 <T	
1991 SEP	BDL		BDL	BDL	1.400	.900 <T	
1991 OCT	BDL		BDL	BDL	1.500	1.100	
1991 NOV	BDL		BDL	BDL	BDL	BDL	
1992 JAN	BDL		BDL	BDL	2.500	2.100	
1992 MAY	BDL		BDL	BDL	BDL	BDL	
1992 JUL		BDL	BDL	BDL	1.200	1.900	

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUWADGE WELL SUPPLY

VOLATILES

TETRACHLOROETHYLENE (UG/L)

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
			DET'N LIMIT = 0.05		GUIDELINE = 65 (A5)		
1991 JAN	BDL	.	3.900	.	.900	.400 <T	.
1991 FEB	BDL	.	3.750	.	.200 <T	.400 <T	.
1991 APR	.050 <T	.	5.250	.	.250 <T	.300 <T	.
1991 MAY	BDL	.	3.750	.	.100 <T	.150 <T	.
1991 JUN	BDL	.	3.950	.	.150 <T	.150 <T	.
1991 JUL	BDL	.	2.600	.	.200 <T	.250 <T	.
1991 AUG	BDL	.	3.250	.	.200 <T	.150 <T	.
1991 SEP	BDL	.	3.400	.	.100 <T	.500 <T	.
1991 OCT	BDL	.	5.400	.	.300 <T	.400 <T	.
1991 NOV	BDL	.	4.500	.	.300 <T	.300 <T	.
1991	BDL	.	.650	.	.350 <T	.400 <T	.
1992 JAN	BDL	.	.750	.	.200 <T	.200 <T	.
1992 MAY	BDL	.	1.500	.	BDL	.400 <T	.
1992 JUL	.	BDL	.900	.100 <T	.250 <T	.150 <T	.

BROMOFORM (UG/L)

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
			DET'N LIMIT = 0.20		GUIDELINE = 350 (A1+)		
57 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	.

1122-TETCHLOROETHANE (UG/L)

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
			DET'N LIMIT = 0.05		GUIDELINE = 0.17 (D4)		
57 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	.

VINYL CHLORIDE (UG/L)

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
			DET'N LIMIT = 0.100		GUIDELINE = 2 (D1)		
9 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	.

C12-DICHLOROETHYLENE (UG/L)

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
			DET'N LIMIT = 0.100		GUIDELINE = 70 (D1)		
9 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	.

CHLOROBENZENE (UG/L)

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
			DET'N LIMIT = 0.10		GUIDELINE = 1510 (D3)		
57 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	.

TABLE 4

DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUWADGE WELL SUPPLY

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
VOLATILES							
1,4-DICHLOROBENZENE (UG/L)			DET'N LIMIT = 0.10		GUIDELINE = 5 (A1)		
57 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	
1,3-DICHLOROBENZENE (UG/L)			DET'N LIMIT = 0.10		GUIDELINE = 3750 (D3)		
57 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	
1,2-DICHLOROBENZENE (UG/L)			DET'N LIMIT = 0.05		GUIDELINE = 200 (A1)		
57 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	
ETHYLENE DIBROMIDE (UG/L)			DET'N LIMIT = 0.05		GUIDELINE = 50 (D1)		
57 SAMPLES	BDL	BDL	BDL	BDL	BDL	BDL	
TOTL TRIHALOMETHANES (UG/L)			DET'N LIMIT = 0.50		GUIDELINE = 350 (A1)		
1991 JAN	BDL	.	BDL	.	5.700	6.600	.
1991 FEB	BDL	.	BDL	.	5.700	6.950	.
1991 APR	BDL	.	BDL	.	12.600	21.300	.
1991 APR	BDL	.	BDL	.	14.900	25.450	.
1991 MAY	BDL	.	BDL	.	12.250	18.800	.
1991 JUN	BDL	.	BDL	.	42.050	21.700	.
1991 JUL	BDL	.	BDL	.	36.100	25.400	.
1991 AUG	BDL	.	BDL	.	5.900	20.250	.
1991 SEP	BDL	.	BDL	.	36.900	27.500	.
1991 OCT	BDL	.	BDL	.	48.100	42.000	.
1991 NOV	BDL	.	BDL	.	BDL	BDL	.
1992 JAN	BDL	.	BDL	.	43.100	24.600	.
1992 MAY	BDL	.	BDL	.	1.300 <T	1.050 <T	.
1992 JUL	.	2.000 <T	BDL	BDL	22.900	20.800	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992 MANITOUWADGE WELL SUPPLY

	WELL 1 RAW	WELL 2 RAW	WELL 3 RAW	WELL 4 RAW	RESERVOIR TREATED	DIST. SYSTEM WARBLER DR FREE FLOW	DIST. SYSTEM WARBLER DR STANDING
RADIONUCLIDES							
COBALT 60 (BQ/L)	)		DET'N LIMIT = 0.70		GUIDELINE = N/A		
6 SAMPLES	BDL	.	.		BDL	.	.
CESIUM 134 (BQ/L)	)		DET'N LIMIT = 0.70		GUIDELINE = N/A		
6 SAMPLES	BDL	.	.		BDL	.	.
CESIUM 137 (BQ/L)	)		DET'N LIMIT = 0.70		GUIDELINE = 50 (A1)		
6 SAMPLES	BDL	.	.		BDL	.	.
GROSS ALPHA COUNT (BQ/L)	)		DET'N LIMIT = 0.04		GUIDELINE = 0.55 (D1)		
1991 MAY	BDL	.	.050	.	BDL	.	.
1992 JAN	.090	.	.100	.	.090	.	.
GROSS BETA COUNT (BQ/L)	)		DET'N LIMIT = 0.04		GUIDELINE = N/A		
1991 MAY	.100	.	.110	.	.090	.	.
1992 JAN	.100	.	.090	.	.080	.	.
TRITIUM (BQ/L)	)		DET'N LIMIT = 7.00		GUIDELINE = 40000 (A1)		
1991 MAY	11.000	.	12.000	.	BDL	.	.
1992 JAN	BDL	.	BDL	.	BDL	.	.
IODINE 131 (BQ/L)	)		DET'N LIMIT = 0.70		GUIDELINE = 10 (A1)		
6 SAMPLES	BDL	.	.		BDL	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE	
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BACTERIOLOGICAL				
FECAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	0	(A1)
STANDARD PLATE COUNT MEMBRANE FILT.	CT/ML	0	500/ML	(A3)
TOTAL COLIFORM BACKGROUND MF	CT/100ML	0	N/A	
TOTAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	5/100ML	(A1)
CHEMISTRY (FLD)				
FIELD COMBINED CHLORINE RESIDUAL	MG/L	0	N/A	
FIELD TOTAL CHLORINE RESIDUAL	MG/L	0	N/A	
FIELD FREE CHLORINE RESIDUAL	MG/L	0	N/A	
FIELD PH	DMNSLESS	N/A	6.5-8.5	(A4)
FIELD TEMPERATURE	DEG.C	N/A	15.0	(A3)
FIELD TURBIDITY	FTU	N/A	1.0	(A1)
CHEMISTRY (LAB)				
ALKALINITY	MG/L	0.20	30-500	(A4)
AMMONIUM TOTAL	MG/L	0.002	0.05	(F2)
CALCIUM	MG/L	0.20	100.0	(F2)
CHLORIDE	MG/L	0.20	250.0	(A3)
COLOUR	TCU	0.50	5.0	(A3)
CONDUCTIVITY	UMHO/CM	1.00	400.0	(F2)
CYANIDE	MG/L	0.001	0.2	(A1)
DISSOLVED ORGANIC CARBON	MG/L	0.10	5.0	(A3)
FLUORIDE	MG/L	0.01	1.5*	(A1)
HARDNESS	MG/L	0.50	80-100	(A4)
IONCAL	DMNSLESS	N/A	N/A	
LANGELIERS INDEX	DMNSLESS	N/A	N/A	
MAGNESIUM	MG/L	0.10	30.0	(F2)
NITRATES (TOTAL)	MG/L	0.005	10.0	(A1)
NITRITE	MG/L	0.001	1.0	(A1)
NITROGEN TOTAL KJELDAHL	MG/L	0.02	N/A	
PH	DMNSLESS	N/A	6.5-8.5	(A4)
PHOSPHORUS FIL REACT	MG/L	0.0005	N/A	
PHOSPHORUS TOTAL	MG/L	0.002	0.4	(F2)
POTASSIUM	MG/L	0.010	10.0	(F2)
RESIDUE FILTRATE (CALCULATED TDS)	MG/L	N/A	500.0	(A3)
SODIUM	MG/L	0.20	200.0	(A4)
SULPHATE	MG/L	0.20	500.0	(A4)
TURBIDITY	FTU	0.05	1.0	(A1)

* The Maximum Acceptable Concentration (MAC) for **naturally occurring fluoride** in drinking water is 2.4 mg/L.

CHLOROAROMATICS				
1,2,3-TRICHLOROBENZENE	NG/L	5.0	N/A	
1,2,3,4-TETRACHLOROBENZENE	NG/L	1.0	N/A	
1,2,3,5-TETRACHLOROBENZENE	NG/L	1.0	N/A	
1,2,4-TRICHLOROBENZENE	NG/L	5.0	10000	(I)
1,2,4,5-TETRACHLOROBENZENE	NG/L	1.0	38000	(D4)
1,3,5-TRICHLOROBENZENE	NG/L	5.0	N/A	
2,3,6-TRICHLOROTOLUENE	NG/L	5.0	N/A	
2,4,5-TRICHLOROTOLUENE	NG/L	5.0	N/A	
2,6A-TRICHLOROTOLUENE	NG/L	5.0	N/A	
HEXACHLOROBENZENE (HCB)	NG/L	1.0	10	(C1)
HEXACHLOROBUTADIENE	NG/L	1.0	450	(D4)
HEXACHLOROETHANE	NG/L	1.0	1900	(D4)
OCTACHLOROSTYRENE	NG/L	1.0	N/A	
PENTACHLOROBENZENE	NG/L	1.0	74000	(D4)

CHLOROPHENOLS				
2,3,4-TRICHLOROPHENOL	NG/L	100.0	N/A	
2,3,4,5-TETRACHLOROPHENOL	NG/L	20.0	N/A	
2,3,5,6-TETRACHLOROPHENOL	NG/L	10.0	N/A	

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE	
2,4,5-TRICHLOROPHENOL	NG/L	100.0	2600000	(D4)
2,4,6-TRICHLOROPHENOL	NG/L	20.0	5000	(A1)
PENTACHLOROPHENOL	NG/L	10.0	60000	(A1)
METALS				
ALUMINUM	UG/L	0.10	100	(A4)
ANTIMONY	UG/L	0.05	146	(D4)
ARSENIC	UG/L	0.10	25	(A1)
BARIUM	UG/L	0.05	1000	(A2)
BERYLLIUM	UG/L	0.05	6800	(D4)
BORON	UG/L	2.00	5000	(A1)
CADMIUM	UG/L	0.05	5	(A1)
CHROMIUM	UG/L	0.50	50	(A1)
COBALT	UG/L	0.02	N/A	
COPPER	UG/L	0.50	1000	(A3)
IRON	UG/L	6.00	300	(A3)
LEAD	UG/L	0.05	10	(A1)
MANGANESE	UG/L	0.05	50	(A3)
MERCURY	UG/L	0.02	1	(A1)
MOLYBDENUM	UG/L	0.05	N/A	
NICKEL	UG/L	0.20	350	(D3)
SELENIUM	UG/L	1.00	10	(A1)
SILVER	UG/L	0.05	N/A	
STRONTIUM	UG/L	0.10	N/A	
THALLIUM	UG/L	0.05	13	(D4)
TITANIUM	UG/L	0.50	N/A	
URANIUM	UG/L	0.05	100	(A1)
VANADIUM	UG/L	0.05	N/A	
ZINC	UG/L	0.20	5000	(A3)
POLYNUCLEAR AROMATIC HYDROCARBONS				
ANTHRACENE	NG/L	1.0	N/A	
BENZO(A) ANTHRACENE	NG/L	20.0	N/A	
BENZO(A) PYRENE	NG/L	5.0	10	(A1)
BENZO(B) CHRYSENE	NG/L	2.0	N/A	
BENZO(B) FLUORANTHENE	NG/L	10.0	N/A	
BENZO(E) PYRENE	NG/L	50.0	N/A	
BENZO(G,H,I) PERYLENE	NG/L	20.0	N/A	
BENZO(K) FLUORANTHENE	NG/L	1.0	N/A	
CHRYSENE	NG/L	50.0	N/A	
CORONENE	NG/L	10.0	N/A	
DIBENZO(A,H) ANTHRACENE	NG/L	10.0	N/A	
DIMETHYL BENZO(A) ANTHRACENE	NG/L	5.0	N/A	
FLUORANTHENE	NG/L	20.0	42000	(D4)
INDENO(1,2,3-C,D) PYRENE	NG/L	20.0	N/A	
PERYLENE	NG/L	10.0	N/A	
PHENANTHRENE	NG/L	10.0	N/A	
PYRENE	NG/L	20.0	N/A	
PESTICIDES & PCB				
ALACHLOR (LASSO)	NG/L	500.0	5000	(A2)
ALDRIN	NG/L	1.0	700	(A1)
ALPHA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	700	(G)
ALPHA CHLORDANE	NG/L	2.0	7000	(A1)
AMETRINE	NG/L	50.0	300000	(D3)
ATRATONE	NG/L	50.0	N/A	
ATRAZINE	NG/L	50.0	60000	(A2)
DESETHYL ATRAZINE	NG/L	200.0	60000	(A2)
BETA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	300	(G)
CYANAZINE (BLADEX)	NG/L	100.0	10000	(A2)
DIELDRIN	NG/L	2.0	700	(A1)
ENDOSULFAN 1 (THIODAN I)	NG/L	2.0	74000	(D4)
ENDOSULFAN 2 (THIODAN II)	NG/L	5.0	74000	(D4)
ENDOSULFAN SULPHATE (THIODAN SULPHATE)	NG/L	5.0	N/A	

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE	
ENDRIN	NG/L	5.0	1600	(D3)
GAMMA CHLORDANE	NG/L	2.0	7000	(A1)
HEPTACHLOR	NG/L	1.0	3000	(A1)
HEPTACHLOR EPOXIDE	NG/L	1.0	3000	(A1)
HEXACHLOROCYCLOPENTADIENE	NG/L	5.0	206000	(D4)
LINDANE (GAMMA BHC)	NG/L	1.0	4000	(A1)
METHOXYCHLOR	NG/L	5.0	900000	(A1)
METOLACHLOR	NG/L	500.0	50000	(A2)
METRIBUZIN (SENCOR)	NG/L	100.0	80000	(A1)
MIREX	NG/L	5.0	N/A	
P,P-DDD	NG/L	5.0	30000	(A1)
O,P-DDT	NG/L	5.0	30000	(A1)
P,P-DDT	NG/L	5.0	30000	(A1)
P,P-DDE	NG/L	1.0	30000	(A1)
OXYCHLORDANE	NG/L	2.0	N/A	
PCB	NG/L	20.0	3000	(A2)
PROMETONE	NG/L	50.0	52500	(D3)
PROMETRYNE	NG/L	50.0	1000	(A2)
PROPAZINE	NG/L	50.0	700000	(D3)
SIMAZINE	NG/L	50.0	10000	(A2)
DESETHYL SIMAZINE	NG/L	200.0	10000	(A2)
TOXAPHENE	NG/L	500.0	5000	(A1)

PHENOLICS

PHENOLICS (UNFILTERED REACTIVE)	UG/L	0.2	N/A	

SPECIFIC PESTICIDES

2,4 D PROPIONIC ACID	NG/L	100.0	N/A	
2,4,5-TRICHLOROPHENOXY ACETIC ACID	NG/L	50.0	280000	(A1)
2,4-DICHLOROBUTYRIC ACID (2,4-D)	NG/L	100.0	100000	(A1)
2,4-DICHLORORPHENOXYBUTYRIC ACID (2,4-DB)	NG/L	200.0	N/A	
2,4,5-TP (SILVEX)	NG/L	20.0	10000	(A1)
BUTYLATE (SUTAN)	NG/L	2000.0	245000	(D3)
CARBARYL (SEVIN)	NG/L	200.0	90000	(A1)
CARBOFURAN	NG/L	2000.0	90000	(A1)
CHLORPROPHAM (CIPC)	NG/L	2000.0	350000	(G)
CHLORPYRIFOS (DURSBAN)	NG/L	20.0	N/A	
DIALLATE	NG/L	2000.0	N/A	
DIAZINON	NG/L	20.0	20000	(A1)
DICAMBA	NG/L	50.0	120000	(A1)
DICHLOROVOS	NG/L	20.0	N/A	
EPTAM	NG/L	2000.0	N/A	
ETHION	NG/L	20.0	35000	(G)
IPC	NG/L	2000.0	N/A	
MALATHION	NG/L	20.0	190000	(A1)
METHYL PARATHION	NG/L	50.0	9000	(D3)
METHYLTRITHION	NG/L	20.0	N/A	
MEVINPHOS	NG/L	20.0	N/A	
PARATHION	NG/L	20.0	50000	(A1)
PHORATE (THIMET)	NG/L	20.0	2000	(A2)
PICHLORAM	NG/L	100.0	190000	(A2)
PROPOXUR (BAYGON)	NG/L	2000.0	140000	(D3)
RELDAN	NG/L	20.0	N/A	
RONNEL	NG/L	20.0	N/A	

VOLATILES

1,1-DICHLOROETHANE	UG/L	0.10	N/A	
1,1-DICHLOROETHYLENE	UG/L	0.10	7	(D1)
1,2-DICHLOROBENZENE	UG/L	0.05	200	(A1)
1,2-DICHLOROETHANE	UG/L	0.05	5	(A1)
1,2-DICHLOROPROPANE	UG/L	0.05	5	(D1)
1,3-DICHLOROBENZENE	UG/L	0.10	3750	(D3)
1,4-DICHLOROBENZENE	UG/L	0.10	5	(A1)
1,1,1-TRICHLOROETHANE	UG/L	0.02	200	(D1)
1,1,2-TRICHLOROETHANE	UG/L	0.05	0.6	(D4)
1,1,2,2-TETRACHLOROETHANE	UG/L	0.05	0.17	(D4)

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM 1991 AND 1992

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE	
BENZENE	UG/L	0.05	5	(A1)
BROMOFORM	UG/L	0.20	350	(A1+)
CARBON TETRACHLORIDE	UG/L	0.20	5	(A1)
CHLOROBENZENE	UG/L	0.10	1510	(D3)
CHLORODIBROMOMETHANE	UG/L	0.10	350	(A1+)
CHLOROFORM	UG/L	0.10	350	(A1+)
CIS 1,2-DICHLOROETHYLENE	UG/L	0.10	70	(D1)
DICHLOROBROMOMETHANE	UG/L	0.05	350	(A1+)
ETHYLENE DIBROMIDE	UG/L	0.05	50	(D1)
ETHYLBENZENE	UG/L	0.05	2.4	(A3)
M-XYLENE	UG/L	0.10	300	(A3*)
METHYLENE CHLORIDE	UG/L	0.50	50	(A1)
O-XYLENE	UG/L	0.05	300	(A3*)
P-XYLENE	UG/L	0.10	300	(A3*)
STYRENE	UG/L	0.05	100	(D1)
TETRACHLOROETHYLENE	UG/L	0.05	65	(A5)
TRANS 1,2-DICHLOROETHYLENE	UG/L	0.10	70	(D1)
TOLUENE	UG/L	0.05	24	(A3)
TOTAL TRIHALOMETHANES	UG/L	0.50	350	(A1)
TRICHLOROETHYLENE	UG/L	0.10	50	(A1)
VINYL CHLORIDE	UG/L	0.10	2	(D1)
RADIONUCLIDES				
TRITIUM	BQ/L	7.0	40000	(A1)
GROSS ALPHA COUNT	BQ/L	0.04	0.55#	(D1)
GROSS BETA COUNT	BQ/L	0.04	N/A	
COBALT 60	BQ/L	0.70	N/A	
CESIUM 134	BQ/L	0.70	N/A	
CESIUM 137	BQ/L	0.70	50	(A1)
IODINE 131	BQ/L	0.70	10	(A1)

Equal to 15.0 Picocuries/litre

DRINKING WATER SURVEILLANCE PROGRAM
PROGRAM DESCRIPTION

The Drinking Water Surveillance Program (DWSP) for Ontario monitors drinking water quality at municipal water supply systems. The DWSP Database Management System provides a computerized drinking water quality information system for the supplies monitored. The objectives of the program are to provide:
- immediate, reliable, current information on drinking water quality;
- a flagging mechanism for guideline exceedance;
- a definition of contaminant levels and trends;
- a comprehensive background for remedial action;
- a framework for assessment of new contaminants; and
- an indication of treatment efficiency of plant processes.

PROGRAM

The DWSP officially began in April 1986 and is designed to eventually include all municipal water supplies in Ontario. In 1992, 109 systems were being monitored. Water supply locations have been prioritized for surveillance based primarily on criteria such as population density, probability of contamination and geographical location.

An ongoing assessment of future monitoring requirements at each location will be made. Monitoring will continue at the initial locations at an appropriate level and further locations will be phased into the program as resources permit.

A major goal of the program is to collect valid water quality data in context with plant operational characteristics at the time of sampling. As soon as sufficient data have been accumulated and analyzed, both the frequency of sampling and the range of parameters may be adjusted accordingly.

Assessments are carried out at all locations prior to initial sampling, in order to acquire complete plant process and distribution system details and to designate (and retrofit if necessary) all sampling systems and locations. This ensures that the sampled water is a reflection of the water itself.

Samples are taken of raw (ambient water) and treated water at the treatment plant and of consumer's tap water in the distribution system. In order to determine possible effects of distribution on water quality, both standing and free flow water in old and new sections of the distribution system are sampled. Sampling is carried out by operational personnel who have been trained in applicable procedures.

Comprehensive standardized procedures and field test kits are supplied to sampling personnel. This ensures that samples are taken and handled according to standard protocols and that field testing will supply reliable data. All field and laboratory analyses are carried out using "approved documented procedures". Most laboratory analyses are carried out by the Ministry of Environment and Energy (MOEE), Laboratory Services Branch. Radionuclides are analyzed by the Ministry of Labour.

DATA REPORTING MECHANISM

When the analytical results are transferred from the MOEE laboratory into the DWSP system, printouts of the completed analyses are sent to the MOEE District Officer, the appropriate operational staff and are also retained by the DWSP unit.

PROGRAM INPUTS AND OUTPUTS

There are four major inputs and four major outputs in the program.

Program Input - Plant and Distribution System Description

The system description includes plant specific non-analytical information acquired through a questionnaire and an initial plant visit. During the initial assessment of the plant and distribution system, questionnaire content is verified and missing information added. It is intended that all data be kept current with scheduled annual updates.

The Plant and Distribution System Description consists of the following seven components:

1. PROCESS COMPONENT INVENTORY
All physical and chemical processes to which the water is subjected, from the intake pipe to the consumers' tap (where possible), are documented. These include: process type, general description of physical structures, material types, sizes, and retention time for each process within the plant. The processes may be as simple as transmission or as complex as carbon adsorption.

2. TREATMENT CHEMICALS
Chemicals used in the treatment processes, their function, application point, supplier and brand-name are recorded. Chemical dosages applied on the day of sampling are recorded in DWSP.

3. PROCESS CONTROL MEASUREMENTS
Documentation of in-plant monitoring of process parameters (eg. turbidity, chlorine residuals, pH, aluminum residuals) including methods used, monitoring locations and frequency is contained in this section. Except for the recorded Field Data, in-plant monitoring results are not retained in DWSP but are retained by the water treatment plant personnel.

4. DESIGN FLOW AND RETENTION TIME
Hydraulic capacity, designed and actual, is noted here. Retention time (the time that a block of water is retained in the plant) is also noted. Maximum, minimum and average flow, as well as a record of the flow rate on the day of sampling, are recorded in DWSP.

5. DISTRIBUTION SYSTEM DESCRIPTION
This area includes the storage and transmission characteristics of the distribution system after the water leaves the plant.

6. SAMPLING SYSTEM

Each plant is assessed for its adequacy in terms of the sampling of bacteriological, organic and inorganic parameters. Prime considerations in the assessment and design of the sampling system are:

> i/ the sample is an accurate representation of the actual water condition, eg. raw water has had no chemical treatment;
>
> ii/ the water being sampled is not being modified by the sampling system;
>
> iii/ the sample tap must be in a clean area of the plant, preferably a lab area; and
>
> iv/ the sample lines must be organically inert (no plastic, ideally stainless steel).

It is imperative that the sampled water be a reflection not of the sampling system but of the water itself.

The sampling system documentation includes: origin of the water; date sampling was initiated; size, length and material type (intake, discharge and tap); pump characteristics (model, type, capacity); and flow rate.

7. PERSONNEL

This section contains the names, addresses and phone numbers of current plant management and operational staff, distribution system management and operational staff, Medical Officer of Health and appropriate MOEE personnel associated with the plant.

Program Input - Field Data

The second major input to DWSP is field data. Field data is collected at the plant and from the distribution system sites on the day of sampling. Field data consists of general operating conditions and the results of testing for field parameters. General operating conditions include chemicals used, dosages, flow and retention time on the day of sampling, as well as, monthly maximum, minimum and average flows. Field parameters include turbidity, chlorine residuals (free, combined and total), temperature and pH. These parameters are analyzed according to standardized DWSP protocols to allow for interplant comparison.

Program Input - Laboratory Analytical Data

The third major input to DWSP is Laboratory Analytical Data. Samples gathered from the raw, treated and distribution sampling sites are analyzed for the presence of approximately 180 parameters at a frequency of two to twelve times per year. Sixty-five percent of the parameters are organic. Parameters measured may have health or aesthetic implications when present in drinking water. Many of the parameters may be used in the treatment process or may be treatment by-products. Due to the nature of certain analytical instruments, parameters may be measured in a "scan" producing some results for parameters that are not on the DWSP priority list, but which may be of interest. The majority of parameters are measured on a routine basis. Those that are technically more difficult and/or costly to analyze, however, are done less frequently. These include Specific Pesticides and Chlorophenols.

Although the parameter list is extensive, additional parameters with the potential to cause health or aesthetic related problems may be added provided reliable analytical and sampling methods exist.

All laboratory generated data is derived from standardized, documented analytical protocols. The analytical method is an integral part of the data and as methods change, notation will be made and comparison data documented.

Program Input - Parameter Reference Information

The fourth major input to DWSP is Parameter Reference Information. This is a catalogue of information for each substance analyzed on DWSP. It includes parameter name and aliases, physical and chemical properties, basic toxicology, world-wide health limits, treatment methods and uses. The Parameter Reference Information is computerized and can be accessed through the Query function of the DWSP database. An example is shown in figure 1.

Program output - Query

All DWSP information is easily accessed through the Query function, therefore, anything from addresses of plant personnel to complete water quality information for a plant's water supply is instantly available. The DWSP computer system makes relatively complex inquiries manageable. A personal password allowing access into the DWSP query mode in all MOEE offices is being developed by the DWSP group.

Program Output - Action Alerts

Drinking Water quality in Ontario is evaluated against provincial objectives as outlined in the Ontario Drinking Water Objectives publication. Should the reported level of a substance in treated water exceed the Ontario Drinking Water Objective, an "Action Alert" requiring resampling and confirmation is issued. This assures that operational staff, health authorities and the public are notified as soon as possible of the confirmation of an exceedance and remedial action taken. This report supplies a history of the occurrence of past exceedances at the plant plus a historical summary on the parameter of concern.

In the absence of Ontario Drinking Water Objectives, guidelines/limits from other agencies are used. The Parameter Listing System, published by MOEE (ISBN 0-7729-4461-X), catalogues and keeps current guidelines for 650 parameters from agencies throughout the world. If these guidelines are exceeded, the results are flagged and evaluated by DWSP personnel. An "Action Alert" will be issued if warranted.

Program Output - Report Generation

Custom reports can be generated from DWSP to meet MOEE Regional needs and to respond to public requests.

Program Output - Annual Reports

It is the practice of DWSP to produce an annual report containing analytical data along with companion plant information.

FIG.1

PARAMETER REFERENCE INFORMATION

NAME: BENZENE

CAS#:   71-43-2

MOLECULAR FORMULAE: C_6H_6

DETECTION LIMIT: (FOR METHOD POCODO) 0.05 µg/L

SYNONYMS: BENZOL; BENZOLE; COAL NAPHTHA; CARBON OIL (27)
                               CYCLOHEXATRIENE (41)

CHARACTERISTICS: COLOURLESS TO LIGHT-YELLOW, MOBILE, NONPOLAR LIQUID, OF
                               HIGHLY REFRACTIVE NATURE, AROMATIC ODOUR; VAPOURS BURN
                               WITH SMOKING FLAME (30)

PROPERTIES: SOLUBILITY IN WATER: 1780-1800 mg/L AT 25C (41)
                               THRESHOLD ODOUR: 0.5 - 10 PPM IN WATER
                               THRESHOLD TASTE: 0.5 mg/L IN WATER (39)
                               ENVIRONMENTAL FATE: MAY BIOACCUMULATE IN LIVING ORGANISMS
                               AND APPEARS TO ACCUMULATE IN ANIMAL TISSUES THAT EXHIBIT
                               A HIGH LIPID CONTENT OR REPRESENT MAJOR METABOLIC SITES,
                               SUCH AS LIVER OR BRAIN; SMALL QUANTITIES EVAPORATE FROM
                               SOILS OR ARE DEGRADED RATHER QUICKLY (80)

SOURCES: COMMERCIAL: PETROLEUM REFINING; SOLVENT RECOVERY; COAL TAR
                               DISTILLATION (39); FOOD PROCESSING AND TANNING INDUSTRIES;
                               COMBUSTION OF CAR EXHAUST.
                               ENVIRONMENTAL: POSSIBLE SOURCE IS RUNOFF.

USES: DETERGENTS; NYLON; INTERMEDIATE IN PRODUCTION OF OTHER
                               COMPOUNDS, SUCH AS PESTICIDES; SOLVENT FOR EXTRACTION AND
                               RECTIFICATION IN RUBBER INDUSTRY; DEGREASING AND CLEANSING
                               AGENT; GASOLINE.

REMOVAL: THE FOLLOWING PROCESSES HAVE BEEN SUCCESSFUL IN REMOVING
                               BENZENE FROM WASTEWATER: GAC ADSORPTION, PRECIPITATION
                               WITH ALUM AND SUBSEQUENT REMOVAL VIA SEDIMENTATION,
                               COAGULATION AND FLOCCULATION, SOLVENT EXTRACTION,
                               OXIDATION

ADDITIONAL PROPERTIES: MOLECULAR WEIGHT: 78.12
                               MELTING POINT: 5.5°C (27)
                               BOILING POINT: 80.1°C (27)
                               SPECIFIC GRAVITY: 0.8790 AT 20°C (27)
                               VAPOUR PRESSURE: 100 MM AT 26.1°C (27)
                               HENRY'S LAW CONSTANT: 0.00555 ATM-M3/MOLE (41)
                               LOG OCT./WATER PARTITON COEFFICIENT: 1.95 TO 2.13 (39)
                               CARBON ADSORPTION: K=1.0; 1/N=1.6; R=0.97; PH=5.3 (41)
                               SEDIMENT/WATER PARTITION COEFFICIENT: NO DATA

Appendix B

DWSP SAMPLING GUIDELINE

i) Raw and Treated at Plant

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Bacteriological	-220 mL plastic bottle with white seal on cap -do not rinse bottle, preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid (HNO_3) (Caution: HNO_3 is corrosive)
Volatiles (duplicates) (OPOPUP)	-45 mL glass vial with septum (teflon side must be in contact with sample) -do not rinse bottle -fill bottle completely without bubbles
Organics (OWOC),(OWTRI)	-1 L amber glass bottle per scan -do not rinse bottle -fill to 2 cm from top
Specific Pesticides (OWCP),(PEOP),(PECAR)	-as per Organics -three extra bottles must be filled
Polyaromatic hydrocarbons (OAPAHX)	-1 L amber glass bottle per scan -do not rinse bottle -fill to 2 cm from top -add 25 drops of sodium thiosulphate
Cyanide (Treated only)	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops sodium hydroxide (NaOH) (Caution: NaOH is corrosive)
Mercury	-250 mL glass bottle -rinse bottle and cap three times -fill to top of label -add 20 drops each nitric acid (HNO_3) and potassium dichromate ($K_2Cr_2O_7$) (Caution: HNO_3&$K_2Cr_2O_7$ are corrosive)

Phenols	-250 mL glass bottle
	-do <u>not</u> rinse bottle, preservative has been added
	-fill to top of label
Radionuclides	-4 L plastic jug
(as scheduled)	-do <u>not</u> rinse, carrier added
	-fill to 5 cm from top
Organic Characterization	-1 L amber glass bottle; instructions
(GC/MS - once per year)	as per organic
(PBVOL),(PBEXT)	-250 mL glass bottle
	-do <u>not</u> rinse bottle
	-fill completely without bubbles

Steps:

1. Let sampling water tap run for an adequate time to clear the sample line.

2. Record time of day on submission sheet.

3. Record temperature on submission sheet.

4. Fill up all bottles as per instructions.

5. Record chlorine residuals (free, combined and total for treated water only), turbidity and pH on submission sheet.

6. No smoking in area of sample location.

ii) **Distribution Samples (standing water)**

General Chemistry	-500 mL plastic bottle (PET 500)
	-rinse bottle and cap with sample water three times
	-fill to 2 cm from top
Metals	-500 mL plastic bottle (PET 500)
	-rinse bottle and cap three times
	-fill to 2 cm from top
	-add 10 drops nitric acid (HNO_3)
	(**Caution:** HNO_3 is corrosive)

Steps:

1. Record time of day on submission sheet.

2. Place bucket under tap and open cold water.

3. Fill to predetermined volume.

4. After mixing the water, record the temperature on the submission sheet.

5. Fill general chemistry and metals bottles.

6. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.

iii) Distribution Samples (free flow)

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Bacteriological	-250 mL plastic bottle with white seal on cap -do not rinse bottle, preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid HNO_3 (Caution: HNO_3 is corrosive)
Volatiles (duplicate) (OPOPUP)	-45 mL glass vial with septum (teflon side must be in contact with sample) -do not rinse bottle, preservative has been added -fill bottle completely without bubbles
Organics (OWOC)	-1 L amber glass bottle per scan -do not rinse bottle -fill to 2 cm from top
Polyaromatic Hydrocarbons (OAPAHX)	-1 L amber glass bottle per scan -do not rinse bottle -fill to 2 cm from top -add 25 drops of sodium thiosulphate

Steps:

1. Record time of day on submission sheet.

2. Let cold water flow for five minutes.

3. Record temperature on submission sheet.

4. Fill all bottles as per instructions.

5. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.